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BULLETIN OF THE

TAYLOR SOCIETY, New York

AN INTERNATIONAL SOCIETY TO PROMOTE THE SCIENCE
AND THE ART OF ADMINISTRATION AND OF MANAGEMENT

December, 1928, Meeting Papers Continued:

Some Observations on Workers' Organizations
By MORRIS LLEWELLYN COOKE

Workers' Participation in Management
By GEOFFREY C. BROWN

Marketing Problems of a Manufacturer of Equipment
By RALPH H. DICK

Engineering and Management
By G. E. SCHULZ

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Engineering Societies Building
29 W. Thirty-Ninth St.
New York

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CONGRESS
DIVISION

FEBRUARY, 1929 VOL. XIV, NO. 1

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Objects of the Taylor Society Incorporated

The objects of this Society are, through research, discussion, publication and other appropriate means:

1. To secure—for the common benefit of the community, the worker, the manager and the employer—understanding and intelligent direction of the principles of administration and management which govern organized effort for accomplishing industrial and other social purposes.

2. To secure the gradual elimination of unnecessary effort and of unduly burdensome toil in the accomplishment of the work of the world.

3. To promote the scientific study and teaching of the principles governing organized effort, and of the mechanisms of their adaptations and application under varying and changing conditions.

4. To promote general recognition of the fact that the evaluation and application of these principles and mechanisms are the mutual concern of the community, the worker, the manager and the employer.

5. To inspire in labor, manager and employer a constant adherence to the highest ethical conception of their individual and collective responsibility.

Membership

The membership of the Society comprises Members, Junior Members, Honorary Members, Life Members, Firm Members, Contributing Members and Student Associates. Application for membership should be made on a regular form which may be secured from the Society. New members may be elected directly to the grades marked*.

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4. **Life Member*: Any Member who has prepaid all dues by the payment of $500.

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All dues are payable in advance, either annually or in semi-annual installments. The fiscal year is November 1 to October 31. Members elected other than at the beginning of the fiscal year are charged pro rata (quarterly) for the first year.

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BULLETIN OF THE
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May 1 and 2, 1929
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Charlotte North Carolina

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Comment

THE picture accompanying Mr. Dick's article is an ABC summary of the most advanced practice in present day sales management. What observation balloons are to an army, the various forms of research are to a business. The blimps of research observe the qualitative and quantitative conditions of present markets, potential markets, and undeveloped resources, products and methods, and establish a factual basis for competitive strategy and tactics.

A VERY important problem of present day mechanization of industry is discussed in Mr. Schulz's paper. Mass consumption and mass production are stimulating the use of single-purpose equipment arranged in series for continuous-flow processing. In such production most of the functions of the planning room in variable processing seem to have disappeared. But Mr. Schulz says not; they are present, performed by the machines themselves, and must be properly provided for in designing the machines. Therefore the engineering of today must be something broader than it was in the past. The designer must be industrial as well as mechanical or electrical engineer.

APROPOS the germane papers of Mr. Cooke and Mr. Brown, we find in the files of the BULLETIN the development of their major concept—functional leadership. In 1914 Robert Valentine and Robert Wolf in expounding their respective doctrines of consent and creative self-expression, called attention to the opportunity which these offer for leadership. Wrote Horace B. Drury in 1917, "We want all along the line not only men who can do what they are told to do, but men who can do things we would never think of ourselves." In the same year Mr. Cooke observed, "Should we not learn in every relation of life to follow the lead of the particular individual who is charged with any given function, whether he be President of the United States, the traffic officer, or the clerk in the office?" In 1924 we find Henry S. Dennison declaring that "we must find ourselves forced to answer that . . . the managing factor finds itself to all practical purposes coterminous with the whole active organization." And so on to phases of the problem presented by the papers in this issue.

Some Observations on Workers' Organizations[1]

Presidential Address Before the Fifteenth Annual Meeting of the Taylor Society

By **MORRIS LLEWELLYN COOKE**
Consulting Engineer, Philadelphia, Pa.

The interests of society, including those of the workers, suggest some measure of collective bargaining in industry to the end that the weaker side may be represented in negotiations as to hours, wages, status and working conditions. Collective bargaining implies the organization of the workers on a basis extensive enough—say nation-wide—as to make this bargaining power effective. But a bargaining position which implies division into two camps, fundamental as it now is admitted to be, must in a world abandoning competition for co-operation, gradually give way, so that if the group cohesion of the workers is to be continued it will be through giving to labor organizations that functional status in the industrial process which is now denied. This can only be done through the discovery of elements of the work which can be as well, or better, done by the group than by individuals.

If labor organizations are in fact desirable social agencies and essential to the orderly conduct of industry, they logically come within the field of management and industrial engineering. It therefore becomes a part of our task to discover all necessary outlets for the energy and spirit of the grouped workers and to aid in the cultivation on the part both of management and labor of those newer disciplines which will effect the maximum co-operative effort.

PERHAPS the amenities of this occasion permit a word of thanks to this Society and its co-operating members for the pleasure of two terms as president and an equally warm word of welcome, tinged with friendly envy, to the incoming president, a distinguished American executive whose consistent following of the star of Scientific Management has added lustre to the movement and yielded rich returns alike to owner, manager and worker.

The Taylor Society has up to the present time ignored what is an accepted practice in other similar organizations, that of expecting from its outgoing president some more or less formal discussion of a topic coming within the range of his professional experience. Such presidential addresses have been useful both as informative and discussion-provoking agencies. With the hope that it may lead my successors thus to share with you both their thinking and their experience, I will attempt to summarize for you my speculations about an important subject which has thus far figured but little in our transactions.

Assuming that the management movement, in this country at least, acquired its technique and philosophy from Taylor, we must admit that it ranged, at least during the first two or three decades, over rather narrow even if fundamental problems. Management as practised by those who followed it as a definite vocation prior to 1910 had to do almost exclusively with operations within single plants, in rare instances getting beyond the operations of single departments of those plants. Only within the last year or two have we had from the pen of our president-elect a paper on the application of the principles and philosophy of Scientific Management to the integration of widely separated plants, the story of a development which has continued now for over twenty years and yielded rich returns to owner, manager and worker alike.

We must look forward to a continued widening of the field of management in a world interested in uniform cost systems, national trade organizations; national and even international standards, and sales syndicates; the vertical and horizontal integration of widely different industries, inter-industry research organizations[2] and "combinations" of one sort or another operating in national and worldwide fields, and in some cases not publicly, legally or usefully. That the management movement is accepting this wider point of view has been illustrated recently in the organization of the

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[1] Paper presented before a meeting of the Taylor Society, New York, December 6, 1928.

[2] Tweedy, Raymond L., "The Manufacturers' Research Association," *Bulletin of the Taylor Society,* Vol. XI, No. 6, December, 1926, pp. 275-283.

International Management Institute, with headquarters in Geneva, through the success of a series of biennial Scientific Management Congresses and by the representation of this Society and foreign management organizations at the 1927 International Economic Conference.

These wide departures from the areas of our original interest arouse one's curiosity as to why it is that we have all but ignored one of the most vital factors in the whole industrial domain—the organizations of the workers. It is to a discussion of this subject that I now invite your attention. For I am more and more of the opinion that we must consider it as coming within our professional field quite as much as any other factor in industry. If we have failed adequately to recognize this subject, I think that it has been accidental rather than studied. Perhaps it has been because our income has been so largely from the employer group, for where the treasure is, there the heart is also. Mr. Average Employer has tried to ignore the subject of labor organization insofar as the actualities at any given time and place have permitted such an attitude.

A far sighted member of this Society recently wrote me that he had never considered it his duty as a manager of factories belonging to other people to devote any part of his time or energy to promoting or helping in the organization or operation of any union. But this may not necessarily be a defensible policy for enlightened employers in the future. The record of this industrial manager, I feel quite sure, has been as entirely "satisfactory to the unions" as he claims it has been. But again I am not sure that in the days to come simply to satisfy the unions will constitute any more valid test of professional conduct than to satisfy employers now implies such a test.

If the organization of the workers on an effective basis is a desirable end from the standpoint of the best conduct of industry, can it be made wholly the responsibility of the workers to effect it? Will conduct on the part of the employer which prevents such organization continue to be desirable no matter how otherwise desirable such conduct may be? Is it not possible that the workers have the same right to expect co-operation in their organizations on the part of capital and management as capital and management have always invited—in some cases demanded—something akin to co-operation from labor? If we should come to look upon some organization of the workers, such as labor unions, as a deep social need, might it not develop that practices, however otherwise enlightened they may be, which withdraw any group of employes from the support of such organizations, may become anti-social? If such proves to be the case, any employer setting up working standards, even *above* those demanded by labor organizations, and resisting the effective organization of his employes, may in fact be acting without a due regard for this deep social need.

I have every desire not to be dogmatic. But also I desire to be reasonably realistic and rational as well as forward looking in the matter of the attitude which should govern the relations between an industrial enterprise and its grouped employes. The question involves a complex of loyalties which is not likely to be quite the same for any two people, so that even if I could fully state my own faith with respect to the scientific approach to a subject so charged with conflict, I should not suggest that my formulae might fit anyone else. I have in mind to raise the question of the relation of industry to each individual employe, not in his or her capacity as an individual pure and simple, but rather as a member of the *group* of employes, whether that group is formally recognized as a company union, a standard union or some other group formation yet to be worked out. I want primarily to evaluate the group idea and only incidentally to discuss the way in which company unions, or standard unions or any other form of group organization may give the idea vitality.

I am now asking myself as a professional management engineer just how much responsibility *I* have for forwarding movements which have for their object the grouping of employes as contrasted with their isolated individualization. And frankly what has on my part been a somewhat studied attitude does not now seem to me to represent a tenable position. For while I look upon a virile labor union movement as a social necessity, I have not only felt no personal responsibility in regard to it but have rather studiously avoided even giving advice to my friends in the labor unions, except when specifically requested to do so. The fact that labor unions and their leaders are easy to criticize, need new goals, and are all but unconscious of what science is doing to them, does not now seem to constitute for me an adequate alibi. It does not seem probable to me that the unions will in the end get along as well without the active assistance and co-operation of Veblen's technicians as they will with it. "Trade unions cannot find the way to co-operation alone; neither can they make the transition alone," as one highly intelligent and really inspired labor leader recently wrote to me. If we are to get away from the bitterness and bickering which constitute the worst outcome of the Industrial Revolution, there must be more frankness in our discussions. If the confidence which begets frankness is to be established some *status* for organized labor must be afforded. "Yellow dog contracts" or a grossly unfair injunction practice, or obviously unnecessary unemployment or peremptory wage cuts, make it difficult for labor to abandon force.

We management engineers have been preaching away at obdurate and inefficient manufacturers in season and out of season through more than a generation, with mighty few thanks for our interest. Of course, speaking quite generally, we carried on this educational work among manufacturers because in that way lay our economic livelihood. I am now wondering whether we should not direct some of our energies and eloquence toward the problem of the organization of the workers—company unions, standard unions, what you will! As professional management engineers should we not include within our field the development of those techniques by which the *various* organizations of the workers can be given a place in the industrial process consistent with all that science is in the way of contributing to industry. It goes without saying that this involves no acceptance on our part of those features of workers' organizations which do not make for an ordered industry. The leadership and current practices of the grouped workers will be just as open to our analysis and criticism as the manufacturers and their techniques have always been. I suppose, too, we should have to be as callous to the buffetings of those workers who did not value our cogitations as we have been to the indifference and misunderstanding of the employing group.

After all, our civilization is pretty young industrially speaking. Even since the war, unless the entire world is very much mistaken, we have entered "a new day"—not necessarily the last such new day! The object of this discussion is to discover some of the principles which should guide us in this new day of Scientific Management, high wages and standards of living, mass production, quick changes, co-operation, mechanical improvement, and so on. Lewis E. Pierson, President of the United States Chamber of Commerce, sensing the evolutionary character of our industry, has recently emphasized the necessity of *thinking ahead* toward new forms of industrial co-operation, and has expressed the thought that "The day is not far distant when organized business, organized labor and a comprehending government will unite for the intelligent teamwork that alone can solve our problems."

The history of the race indicates that under the institution of private property, the workers—the weaker party—must organize to protect both society and themselves. We no longer work our miners through hours so long that they have to maintain underground homes in which their children are born. Nor do our present day piece rate systems force immigrant tailors to sleep on their cutting boards. But each year new problems and new temptations arise which continue very definitely the necessity for some organization of the workers. In a recent industrial survey[3] of the City of Providence it was disclosed that seventy-two employers out of 759 employ 63 per cent of the industrial workers in a district with 400,000 population, and that the plants which these employers control turn out 68 per cent of the goods made in the district, totaling $336,000,000. Is it not possible to conceive of these seventy-two employers mutually deciding on some policy affecting all the labor in the district, and can we be sure that it would be socially desirable that labor should acquiesce in each and every policy so adopted? We still appear to have with us the necessity for some strong organization of employes, very probably national in scope, ready to grapple with any group of employers guilty either of cupidity or of industrial illiteracy.

It is possible that we are getting beyond the point at which the battle is for opportunity to eat and be warm. Mr. Hoover may be only abreast of the times in pleading the cause of the full garage rather than of the full dinner pail. Perhaps in the future we shall be fighting for gasoline rather than for bread, and later for the opportunity to share in the world's highest culture. But as long as property essentially controls avenues to these things, it seems desirable that those with the minimum of property, though in the future they may not be propertyless, be organized somewhat as a balance of power. From a scientific standpoint checks and balances upon each other in the legislative, administrative and judicial branches of our government are very wasteful, but apparently we are not ready to abandon them.

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[3] Industrial Survey of Metropolitan Providence for the year 1926, conducted by Division of Industrial and Municipal Research, Massachusetts Institute of Technology, February, 1928.

Surely I am warranted in thinking that a goodly percentage of the members of this Society believe in some measure of collective bargaining,[4] at least as to wages, hours and working conditions. But there is no virtue in being for collective bargaining unless it is to be effective. Personally I am convinced that collective bargaining can not be effective if the workers' group participating is restricted to a single plant or the plants owned by a single company. Therefore, anything short of a national basis with regional and local subdivisions would probably be unwise from a social standpoint. In wage and other negotiations there is no way of meeting facts except with facts. The gathering of facts is a difficult and at best an expensive matter. Any small group of employes is at a fatal disadvantage in meeting the factual presentation of employers who are almost without exception directly, or indirectly, connected with nation-wide organizations. Shop organizations without national affiliations leave the organized workers without the resources —financial, technical, political—which they require to secure only that recognition which the best interests of our industrial society demand.

The content of collective bargaining to date has had to do almost exclusively with questions as to wages and hours and to a lesser degree with working conditions and status. As I attempted to point out in a recent article,[5] these questions have been settled at least to the point where hours, wages and working conditions no longer alone afford the labor movement a sufficiently virile rallying cry, even though there remains the necessity for continuing the struggle against those who ignore decent standards. The members of this Society for instance are pretty generally convinced that more work can be done in eight hours than in any longer day, or at least, that an eight hour day is fully consonant with a possible American standard of living. The whole philosophy of Scientific Management is based on the policy of high wages with low unit costs.[6] We recognize also that even reactionary employers today believe in good working conditions, sanitary, well lighted shops and all that goes with them. Collective bargaining as to "hours, wages and working conditions" has to do almost exclusively with the division of the profits rather than with production and distribution of the product. It is in the same class with negotiations as to price between a concern and those who buy its product.

So I cannot feel that collective bargaining, even with provisions for general arbitration, constitutes the whole or deeper answer to our problem, essential as I recognize it to be. Nor will giving the organized workers simply a chance to criticize and complain on occasion, and to have these matters satisfactorily adjusted, be sufficient. One can imagine such a system operating at 100 per cent efficiency through a ten year period, and at the end of that time all organized opposition from the workers—whatever form it might take—would be at a standstill. And further, any policy which suggests a permanent division of those engaged in industry into two camps would appear to be out of date, and must necessarily become more and more out of harmony with a world studying discussion, mediation and conciliation and seeking to supplant competition by co-operation. If it can be accomplished, the group of workers must be collectively related to industry in a way not possible under a bargaining status. What we want now is to set up an *integrating* process which will tend more and more to unite us in a common purpose. The development of the techniques by which such unity may be accomplished is a problem common to all productive enterprise whether operated by private capital, by the government, by municipalities, by co-operative societies, by the workers or otherwise.

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[4] In this connection it is interesting to recall the wording of the Gompers resolution, presented at the Industrial Conference held in Washington immediately after the Great War, to which the employers' group objected. "The right of wage earners to organize without discrimination, to bargain collectively, to be represented by representatives of their own choosing in negotiations and adjustments with employers in respect to wages, hours of labor and conditions of employment, is recognized."

[5] Cooke, Morris Llewellyn, "Organized Labor and Research," *American Federationist,* August, 1927.

[6] It is not generally realized that this is the basic idea of Taylor's *"Shop Management,"* 1903.

But the moment we suggest giving to the grouped workers such a functional place in industry, we are met with the statement that this necessarily means a divided leadership; and that leadership to be effective must head up in a single mind. It is argued that, to be effective, management must never be held back or interfered with by the group. This is said to be quite as much for the well-being of the wage earners as it is for capital. This Society recently had the pleasure of listening to Miss Mary P. Follett's "The Illusion of Final Authority."[7] I assume that there was fairly general acceptance of her thesis that the guidance of an industrial enterprise is a much more complicated matter than that contemplated by the arbitrary leadership of a president or even of a chairman of a board, however effective such officials may be.

Assuming that wages and status both have been satisfactorily provided for, and that, for the clarity of this presentation, there are no grievances of any sort, then it is argued that the group has nothing further to do, unless perhaps to secure the highest degree of co-operation on the part of each individual in carrying out the behests of the management. It is argued also that the functional work of management does not need to be supplemented by the group, except as management using its own initiative may from time to time *delegate*[8] to the group isolated tasks which in the opinion of such management may better be performed by the group than by management itself.

We really know very little as to how leadership is constituted—what is its true inwardness—and one may well question whether the interposition of the grouped workers in a place of responsibility and authority in management will detract an iota from its effectiveness. Most of us act under very serious misapprehensions as to the unfailing wisdom of management, the singleness of its purpose, and as to its being untrammeled in reaching its decisions. The banks, for instance, in many cases which have come to my attention, have made good management virtually impossible, and this quite as frequently through an unwise extension of credit as through its withdrawal. When I consider all the agencies inside and outside a plant which measurably influence its management I wonder whether we can actually delimit management in the sense that capital can be delimited.

There is of course a basic distinction in character between capital and management. But I should dislike to believe that there is any such decisive distinction between the characteristics and prerogatives of management on the one hand, and the characteristics and prerogatives of the grouped workers on the other, such as would preclude the interweaving of their efforts along functional lines. With the development of finer disciplines, on the part both of management and of the grouped workers, it may be possible to find ever widening areas of functional co-operation, and this without withdrawing from management one iota of what is vital in its leadership. Possibly management has even more to gain from such a *rapprochement* than has the cause of the organization of the workers.

I wish I might be of use in bringing our profession to feel that the great unthought-out problem of industry is how we can give the grouped (or organized, unionized—call them what you will) workers a *functional* place in the industrial process. How can the group find a work essential to an ordered industry which it can do as well as, or probably better, than it can otherwise be done. I believe it must be something in no way related to the combat and argumentation which must necessarily go on where wages are determined under competitive conditions. I seek to lay this question and problem on the minds and hearts of my professional associates because in this situation, as in so many others, the technicians, though small in number, have come to occupy positions of great tactical importance. I have come almost to dread the typical expert in industry because his knowledge of processes and techniques, usually at the disposal of those who pay most for the service, simply adds to what is now recognized as the rapidly growing disparity in bargaining power between the ownership and the workers. When it was brute force, sheer numbers had weight. But as we get into the real science of industry the game is so intricate that numbers do not count for much. The industrial world is not giving sufficient recognition to the fact that the transference of skill, intensive mechanization and standardization of process and product have markedly influenced the division of power between employer and employe.

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[7] *Bulletin of the Taylor Society,* Vol. XI, No. 5, December, 1926, pp. 243-256.

[8] Delegated responsibility is not functional in the sense that this word is used here.

Recent articles on labor relations fail to state the present industrial situation in the light of history and of an expanding science. For instance, it appears lacking in discrimination to compare the labor union movement with company unions as if they were different aspects of the same picture.[9] These two types of agencies seem to me to be of a totally different order. From the viewpoint of history it can never be the case of the one superseding the other in the sense of taking its place. The standard labor union movement, to whose present day deficiencies I am particularly sensitive —possibly to the point of doing it an injustice— has been, and still is, a redemptive force in human history. Wherever there has been yielding to the temptation to degrade and enslave or unduly harass human beings, there you find the tap roots of the labor movement. It has afforded an almost spiritual outlet for the altruistic labors of countless men and women, some of them of very high types, whether ability, selflessness or elevation of the spirit be the test. At times the labor unions have been the main stay of human liberty itself. It is alleged that present day workers prefer company unions because through them they "get more for their money." But great human movements do not grow out of dinner pails, even full ones. Suffering, privation, ignominy and death itself are the foundations of enduring social structures.

It must be remembered that company unions are experimental and have no record of abiding achievement back of them. Only too frequently they are the promotions of industrial leaders anxious to build up friendly relations with their employes but at the same time to hold that all inclusive veto which has been considered the hallmark of good management. Of course, there are company unions that not only have been honorably and competently conceived but, as developers of good-will, have brought handsome returns not only to the property interest back of the enterprise but to the individual workers as well.[10] Some of the best of them have been useful in experimentation as to the participation of the workers in management and as to the functioning of the group.

Of course, holding rather pessimistic views as to the significance of the company union movement in the whole industrial situation[11] does not force me on to the other horn of our dilemma—the unquestioning support of all the policies or the philosophies of the standard labor union movement. I regret their "craft sectarianism and job separatism"; their failure to develop the tool of research, and particularly their failure to provide adequately for experimentation in the matter of organization in a changing world.[12]

The best of the company unions with which I am familiar have been successful to date largely for reasons which are peculiar to the particular plants in which they happen to be located. In some cases they succeed because of the high character or great ability, or both, of the head of the business. In two instances coming under my observation high wages are the controlling factor in the success of the company union. In the first, a public service corporation, rates which the public pays have been regulated by a public commission so as to make possible exceptionally high wages for the employes of the company. In the other instance, that of a comparatively small concern operating in a restricted field, the success of the enterprise and its profitableness, permitting high wages, have been due almost entirely to a forward looking policy in regard to research. Neither enterprise is in a competitive field.

After the first novelty is worn off it is very difficult to hold the interest of the employes in a company union. Perhaps this might have been expected. In every company union with which I am familiar the program has been very largely provided by the employer, and possibly without much intention contains very little that is genuinely debatable. Certainly no grouping of workers where the urge for organization does not originate with the workers themselves would be expected to hold their interest.

It would appear that our large scale employers no longer take the trade unions so seriously as formerly. Science is making it increasingly easy to ignore them. In "strongly" organized centers and even in some strongly organized industries the techniques by which the union-will is circumvented have been highly developed. Employers who have created reasonable conditions as to hours, wages and working conditions, and as to status for the individual worker, have discovered that it is practically impossible for union organizers effectively to approach their employes. My query is whether this seemingly enlightened policy in the treatment of labor is necessarily well advised when viewed in relation to the total national industrial situation. Of course only a very small number of employers go this far. The temptation is rather to have a company union. For most people it is a great deal easier to run a business with a company union than without one. And it is equally true that for the average run of employers it is harder to operate a business with a standard union than without one. But human experience suggests that in great matters "the easiest way" is not a safe guide, and further that a great industry can only grow out of great experimentation and probably out of great sacrifice.

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[9] Leiserson, William M., "Accomplishment and Significance of Employe Representation," *Personnel* (published by the American Management Association, 20 Vesey Street, New York City), February, 1928.

[10] Bruere, Robert W., "A Quaker Employer Builds a Company Union," *Survey Graphic,* September 1, 1928.

[11] See testimony in Interborough Rapid Transit Company case against William Green, 1928.

[12] Cooke, M. L., "Who is Boss in your Shop," *Annals of the American Academy of Political and Social Science,* Vol. 71, May, 1917, pp. 167-185.

Not being a manufacturer I am permitted the utmost freedom in speculating as to such controls in industry as will ultimately prove most beneficial to society. There are in my mind three major tenets which must be had in view:

1. We must preserve to the worker group in industry, as contrasted with the more direct representatives of the property interests, a fair bargaining position so that they can safeguard themselves, and society on occasion, in the proper distribution of the rewards of productive enterprise and, of increasing importance, against the ineffectiveness and inefficiency of those who control through their property rights, and in the maintenance of that right to an individuality, creativeness and that freedom of thought and opinion essential to racial progress. May it not be that with the advance of science even the safeguarding of individual rights and human freedom itself may have become largely a technical problem, no longer wholly the task of untutored minute men or of labor leaders, no matter how deep their devotion? No other considerations can weigh against these primary objectives, for in the long run if I am not reasonably free, what does it count if I am efficient? Of course I am not arguing against property rights or even against the wisdom of a centralized leadership in the conduct of the enterprise. For it is quite as much in the interests of an effective utilization of property as it is essential to human freedom and progress that the weaker side in this discussion shall maintain an organization which can check the stronger, if and when the necessity therefor arises.

2. There must be a general acceptance of the validity of the scientific method from the top to the bottom. This carries with it the implication that decisions are to be made by those who find the facts and therefore by those who presumably know. Here there must be a word of caution against the dicta of that class of experts who see their problems too narrowly and who place too great dependence upon mathematics in a field where the heart is as much entitled to recognition as is the head. Many decisions—most of them perhaps—may properly be reached pretty far down in the organization scale. Society will gain in effectiveness and stability largely as we learn the technique of making wise decisions without the necessity for constantly consulting the top controls, which are apt to have the property interest too vividly and constantly in mind even for property's own long-run benefit. This means we must take the emphasis off the veto, and more and more stress the development of techniques and personalities capable of reaching right decisions without the deadening regimentation which necessarily grows out of the veto and the policy of *"es ist verboten."* Perhaps working in this direction the institution of property may lose some facets which have made it exceedingly unpopular in certain quarters and which as I see it are not at all essential to its functioning as a master tool in social development.

3. The organization of the workers must be sufficiently broad geographically and by varieties of work to enable the workers to have access to the best that is known of and thought on any matter under their scrutiny. When I consider how much discussion I solicit and from how many different quarters—geographical and otherwise—on relatively simple questions, it becomes apparent that even a numerous group of workers, engaged in a given plant or for a given enterprise, is at an increasingly fatal disadvantage when, dependent upon a company union confined to a single plant, as contrasted with an organization with broader affiliations, it is un-

able adequately to present its side of any given case. The fact that the labor unions at the present time render such service to their members meagerly, if at all, does not prevent one from looking forward to the time when they, or their successors, may be more effectively equipped for this service.[13]

The European labor unions have in the main been compelled to go into politics in order to find an adequate outlet for their creative self-expression, and this with some results that would be highly distasteful to most American constituencies. In England particularly an *impasse* appears to have been reached in which neither the community nor the unions can make further progress along the traditional lines of combat. And yet in the atmosphere of suspicion and mistrust engendered through generations of an embittered collective bargaining, it is not easy to find a constructive outlet for the labor movement, much as forward looking men in all classes desire it. Attention should also be called to the fact that in several European countries the labor unions have been given a functional status by governmental intervention and statute—notably in Italy under a dictator, in Germany under a republic, and in Russia under the rule of the proletariat.[14]

Assuming, then, that with us in America an enlightened social policy toward industry and labor suggests, *first,* the safeguarding in every proper way of the group cohesion of the workers, and *second,* the gradual narrowing of the area of conflicting interest; and further assuming that these ends can only be accomplished through giving the organized workers *functional* status, we are then confronted with the question as to how this can be accomplished. There is no royal road to the ultimate goal. Any worthwhile result will be reached only through trial and error, extended experience and infinite pains.

Perhaps one of the most obvious first steps would be to introduce as much light and science as possible into the discussion of wages—monetary compensations of one kind or another—now constituting as it does the major subject for collective bargaining. Some experience as an arbiter in the field of wage negotiations suggests that the acrimony developed varies inversely with the amount and reliability of the statistics and other data offered in support of any suggested scale. If this has been the situation in the determination of "living" wages, how much more provocative are the possibilities in the determination of "social" wages and in the establishment of profit sharing schemes. Add the complication of "incentive" wages and the various kinds of insurance—unemployment, old age, accident and death—and the grouped workers are seen to have problems which can profitably engage the attention of a numerous body of high grade and socially minded economists, statisticians and accountants.

Of course there should be the same policy of extracting everything which is not *essentially* controversial or debatable in character from the other standard topics of collective bargaining, such as from the discussion of hours, including rest periods; and from status, including the standards covering employment, promotion and discharge; and from working conditions, including sanitation, rest rooms, lunch rooms, and so on. There is really very little in the content of classic collective bargaining which, when once adequately studied, should afford much basis for controversy as between right-minded employers and equally right-minded employes. But it must be recalled that in the past employers have claimed and retained the prerogatives of management *in toto,* and the unions and other organizations of the workers have usually been almost equally insistent that they be freed from any responsibility for the management because wholly without authority. I am assuming that the entire situation in industry has so changed that in the very near future enlightened employers will be as willing and anxious to relinquish to their grouped employes some part in the management, with its corresponding authority and responsibility, as the grouped workers will be to assume some part in it.

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[13] An interesting experiment which may or may not have a bearing on the problem of giving the grouped workers a functional place in the industrial process is an arrangement recently entered into between Hart, Schaffner & Marx, clothing manufacturers of Chicago and the Amalgamated Clothing Workers of America, by which H. S. & M. sell the output of a clothing factory in Milwaukee owned and operated by the Union.

[14] In Great Britain the Liberal Party now accepts "not only as a necessity but as an advantage, the full development of labor unionism, and proposes that on a national scale it should be co-ordinated with the organization of employers." See "Britain's Industrial Future," the Report of the Liberal Industrial Inquiry, Ernst & Benn, London.

In Sweden "it has been found impossible to establish by law compulsory arbitration." Sven Luebeck, Minister of Social Welfare in the new Conservative Cabinet, "has in mind more labor representation in the management of industry." (See New York Tribune, Nov. 11, 1928.)

I have very little hesitation in suggesting that workers' organizations as they are likely to be, or may easily be, constituted in the not-far-distant future, may be given a very distinct function in the matter of inspection and review. Taylor held that the function of inspection to be worth its salt must be quite detached in an organization way from the subject inspected. For instance the checks on bank balances and store room stocks were made by stenographers and others in no way associated with the accounting or stores departments. Even if at the start only suggestions[15] were to be invited, what a wealth of material to draw from would be afforded a union or federation of unions organized to make available operating policies and details in ten thousand plants manufacturing everything from ice cream and toothpicks to locomotives and office buildings.

Of course the affording of an opportunity to make suggestions in itself hardly constitutes a functional relationship. But a suggestion system may be administered so as to constitute at least a wise preliminary. The making of suggestions in the absence of adequate guarantees may represent a distinct loss—both pecuniary and in status—to the individual and to the group participating. Again, it is likely that education and training—on the job—may become a larger and larger factor in industrial progress. Not much imagination is required to see the grouped workers an important and integral factor in this development. It is my observation that time study, as practised in most plants, would be on a much sounder basis if it were open to the review of the group. When the group comes to sense the possibility of job analysis and time study industry may be in for a new adventure.[16] Discipline as administered by an individual—even if he be an employer—is not of the same order as that administered by the group.

Just what all this implies in the way of improvement—or at least change—in the leadership and attitude of the normal standard union of course is another story. But I rather expect that the adoption of the suggested techniques will have quite as marked an effect on the trade unions as on the employer group.

In our effort to peer some distance into the future we are well advised not to go too hard after details. If we have the goal clearly in mind—in this case the maintenance of the organization of the workers in an era of close co-operation as between management and men—and if we know the first steps, good-will should do the rest. It is my hope that to those who are not wholly satisfied with our present industrial organization this paper may be suggestive as to possible lines of a healthy evolution.

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[15] Encouragement in the making of suggestions has been an essential feature of so-called "union-management co-operation" technique. Otto S. Beyer, Jr., engineering representative of the Shopcraft (railroad) Unions affiliated with the International Machinists Union, instigated this system first at the Rock Island Arsenal during the war and later has made it basic to operations on the B. & O. Railroad, Canadian Natonal Railways and elsewhere.

[16] Cooke, Morris L., "Morale as a Factor in Time Study Technique," *Bulletin of the Taylor Society,* Vol. XII, No. 2, April, 1927.

FOR every employe who is "steady in his work" there shall be steady work. The right to regularity in employment is co-equal with the right to regularity in the payment of rent, in the payment of interest on bonds, in the delivery to customers of the high quality of product contracted for. No business is successfully conducted which does not perform fully the obligations incident to each of these rights. Each of these obligations is equally a fixed charge. No dividend should be paid unless each of these fixed charges has been met The reserve to insure regularity of employment is as imperative as the reserve for depreciation; and it is equally a part of the fixed charges to make the annual contribution to that reserve. No business is socially solvent which cannot do so. (Anonymous)

Workers' Participation in Management[1]

How Scientific Management Can Promote a New Functional Status for Workers

By GEOFFREY C. BROWN
Consulting Engineer, East Orange, N. J.

FEW modern industrial developments, I think, have greater significance than the recent progress that our trade unions have been making toward a new citizenship in American industry. Features like the Baltimore and Ohio plan, or the co-operative activities of the Full Fashioned Hosiery Workers, or the Printing Pressmen's Engineering Service—to mention just a few—are not isolated or sporadic developments but are, rather, high points in a tide of progress that is carrying forward the entire labor movement. Organized labor, year by year, is evincing increasing readiness to assume, jointly with management, definite responsibility for the effective conduct of industry; and organized labor is doing so entirely from an awakened realization that by such activity, labor is serving its own best ends.

One phase of this development is manifest in a lively curiosity that the unions are beginning to show as to the sort of management actually prevailing throughout industry. It is not uncommon, nowadays, for a member of our employer or managerial group accustomed to conventional lamentation over labor's old sabotage, and the lump of labor "fallacy," to be brought up in disconcerting fashion with, "How about the Hoover Waste Report—management responsible for over 50 per cent of total waste, labor for less than 25 per cent? There is some real output restriction for you to weep over." The conversation then seeks a less difficult ground such as prohibition or the weather.

A few weeks ago the New Bedford strike came to an end. For many months the organized workers in the textile mills of this New England city had stood out against a 10 per cent wage reduction declared by the mill operators. The employers supported the reduction by a statement that economic conditions peculiar to the industry and entirely beyond their control—Southern competition, etc.—rendered such action necessary. The reply of the union is of great interest because it sounds a note which we are destined, I am sure, to hear with increasing insistence in days to come. The New Bedford Local hotly charged the employers with wasteful management of the mills. The employers countered by reiterating their original statement. The strike which involved fifty-seven mills and twenty-seven thousand workers, lasting over a period of six months, was compromised finally, on the basis of a 5 per cent wage reduction.

I am not concerned at this time with the exact merits of these counter statements in the New Bedford contest. It is common knowledge that economic conditions in the Northern textile area are, colloquially, "not so good." I am much interested, however, in the fact that such an interchange took place. Confronted by this new concern of labor, which is amply supported by additional evidence from other industries, it seems inevitable that effective management of industry soon will be recognized by the unions as a major economic objective, taking its place as such, with the traditional objectives of better wages, hours and conditions of work.

Workers have a tremendous stake in the *quality* of management. To them it means survival, personal development and the tenor of their daily lives. I believe that I echo the experience of most management engineers when I say that in the course of my work I have gone into a considerable number of plants, each struggling along under some form of mismanagement, and that with a few notable exceptions I have found the same state of affairs: low wages, low production, general disorder, inadequate equipment, rule of thumb methods, absence of necessary records, an unpleasant working atmosphere, uncomfortable and unsanitary work places, high labor turnover. A fair proportion of these plants was on the verge of bankruptcy when, as a desperate measure, an outside engineer was called in, and no amount of eleventh hour effort on his part could save them. Sooner or later they failed and the workers, often after years of service, found themselves cast on short notice into the streets to obtain other employment of whatever kind, and on whatever terms, they could. Such establishments are not good places in which to work. They are an unwarranted tax upon society also, and society should spare no effort to banish them from industry. Labor, therefore, on account of its high stake in the quality of management, is entitled to, and through its accredited organizations should, exercise a *critical* function in relation to management. The wise exercise by labor of such a function, I am convinced, can become a highly constructive force in our industrial and social life.

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[1] Paper presented before a meeting of the Taylor Society, New York, December 6, 1928.

This new function, to be effective, however, should be well organized and should have as its important foundation scientific knowledge of just what constitutes good management. Standards of management based on such knowledge can then become available for use by labor in appraising the quality of management in particular establishments. Recorded knowledge of this character now exists, fortunately, in the shape of certain recognized principles of management that have evolved during recent decades and which, taken collectively, comprise the new science of management in its present state of evolution. Some of these principles may be enumerated briefly as follows: effective plant layout; standardization of efficient tools and equipment; orderly despatching of materials through the various stages of production; avoidance of every sort of unnecessary delay, or other waste, in plant activity; equitable setting of piece work rates; careful recording of costs; visible charting of important facts bearing on production, etc., etc. This technique, as intimated, is now on record for suitable adaptation to labor's use.

I wish now, without further delay, to propose tentatively, for the consideration of trade union officers and of the unions, an organization feature through which organized labor, I believe, can exercise a new critical function of co-operation for effective management. I propose that each international or national union maintain at its headquarters a department specially devoted to this function. Such a department might be called the "Industrial Research Department" or "Management Research Department." It would supplement and serve the present standard machinery for collective bargaining and the handling of grievances. Its activities would consist, in a general way, first of compiling for the union facts in regard to efficient management practice for the industry; and second, of compiling information relative to the quality of management prevailing in the individual establishments coming within the union's jurisdiction. I propose, also, that the American Federation of Labor maintain at its headquarters a similar department functioning for the Federation as a whole. These departments can be supported by a small additional levy on the union membership, a definite percentage—say 90 per cent—of the total amount going into the treasury of each international or national, and 10 per cent going to Federation headquarters. Development of the proposed function must, of course, be a gradual process. It should be well considered by the unions and should proceed only under the most competent guidance obtainable.

Perhaps I should emphasize at this point that the proposal does not imply a dual control of industry by management and labor. Final responsibility, and the right to ultimate decision must, as now, rest with management. Labor's function, as set forth, is purely critical and co-operative. I should stress, also, the fact that I am not proposing anything that is dogmatic or rigid. Long ago I discarded all faith in "systems"—anyone's "system"—and I believe now only in certain principles of organization developed in every instance to meet the exigencies of an existing situation.

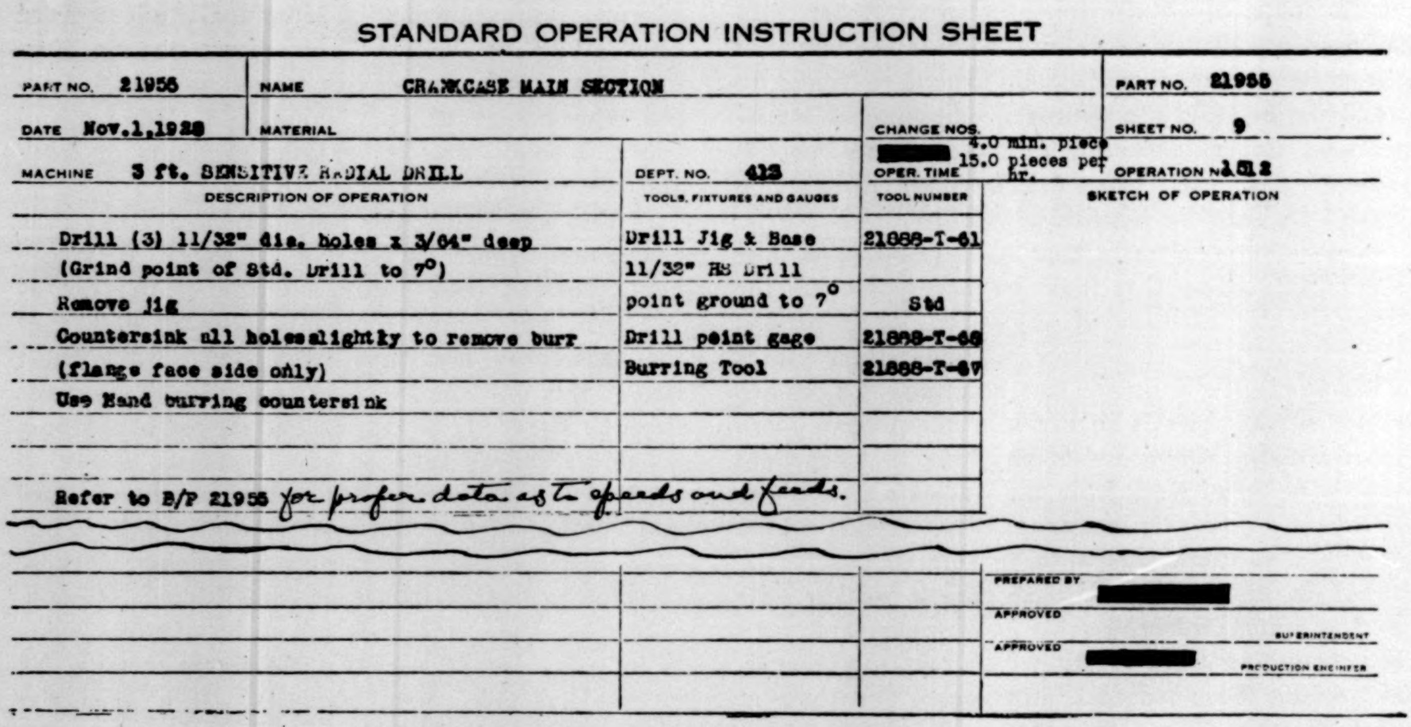
There is no scarcity of problems that demand from labor's standpoint the sustained attention of a department similar to the one just recommended. In the limited time at my disposal, I can only indicate a few typical ones, and offer some tentative ideas as to a possible direction of their solution. In a general way, the proposed function is designed to provide a starting point or nucleus about which may be developed a scientific "labor" approach to management problems. For some decades now, industrial management has been in process of elevation to the scientific and technological planes. There is only one conceivable basis, therefore, upon which organized labor can meet management with adequate effectiveness today, and that basis is scientific. Briefly, organized labor, in order to accumulate power in the industrial world as it now exists, must be equipped with the knowledge and the methods of scientific management.

One problem that calls urgently for the attention of trade unions in their proposed role of industrial critic is that of insistence on adequate cost-finding methods throughout organized industries. A surprising number of concerns, particularly in the ranks of small and medium sized establishments, still are floundering along without any form of cost system. Under such mismanagement the payroll is the only readily visible element of cost, and it looms up like a mountain. Machines may be standing idle during considerable portions of the day for causes not apparent; unnecessary supervisory and clerical functions doubtless are being maintained; unprofitable products are passing through production without anything to reveal the fact that they should be discarded in favor of profitable lines; necessary materials and supplies are almost certain to be unsystematically purchased, stored and moved to their points of use; steam and electric power probably are produced or purchased extravagantly and utilized wastefully. All manner of waste may exist in the absence of a cost system that would drag the evidence of it into uncompromising light. It has been a common practice of traditional management to saddle the cost of its own ineptitude in this respect upon wage earners in the shape of a reduction in wages. Apart from the inequity of this procedure, also, is the fact that the career of any such establishment is bound to be precarious and the tenure of employment for its workers imperilled. The unions, I think, should demand that each plant within their jurisdiction record its costs in a suitable manner.

A second problem is that of developing a time study procedure that will be acceptable to the unions. The attitude of organized labor toward time study is so commonly misunderstood that I wish to clarify it before this meeting. Organized labor, so my friends in the movement have often informed me, is opposed to anything that degrades the character of work from the worker's standpoint. Pioneering scientific management proceeded on the theory that there was nothing fundamentally unsound in the practice of observing a worker with a stop watch; recording his movements and their corresponding time values with great minuteness; subjecting these recorded movements and times to a later scrutiny; discarding those movements which, in the judgment of the time analyst, were unnecessary; correcting movements which were adjudged as wrongly executed; resynthesizing the operation on this basis into an ideal or standard method; assembling the new component movements and times on an instruction sheet, and sending the latter into the shop as a standard method for future performance of that job. If forty men were performing the operation, quite regardless of their individual differences in temperament and physical organization, that, presumably, was the method each must carefully learn; that was the standard each must observe, and for such observance each worker was to receive as his reward a bonus over his regular earnings. Labor leaders who have devoted thought to this subject maintain that such procedure is unsound. "You are degrading the worker's function to a somewhat lower level than that of the machine," they declare. "What interest can any man have in work when all opportunity for intelligent initiative and freedom of action on his part are taken away? Furthermore, the control of this entire process—the elaboration of the job, and the computation of the wage incentive—rests entirely with management. What guarantee has labor that it will be fairly dealt with? What protection is afforded against the unscrupulous manager or the irresponsible time study man?" This is an unadorned representation of labor's attitude toward time study as it has been given to me during many conferences with union officials. Anyone who brings an open mind to its review will admit, I think, that it contains elements of truth and justice.

If this exhausted the issue of time study, the conclusion would be simple. Clearly, it would be, "Abandon time study! Throw it overboard! We will get along somehow without it." But the matter is not thus exhausted. Like most issues, this one has its other side. Work proceeds through time. It is just as impossible to dodge a consideration of time in any scientific study of work as it is to ignore work's other factors of space and energy, or for that matter, work itself. Time study implies the principle of measuring work in relation to one of its major dimensions. Reasonably used, then, it cannot fail to be of great value to industry and to society. No single formula for its use has any special sanctity. If a particular method of conducting time study is found to violate any fundamental human right, by all means change the method, but do not for this reason abandon time study. There is no valuable instrument that cannot be turned to a wrong use. This match that lights my cigarette can burn down a block of houses or touch off a powder magazine. Obviously, then, a scientific attitude toward time study will be one that sees clearly its value, is fully sensible of its besetting dangers, and concentrates on safeguarding its reasonable use.

A brief description of a time study method that I have employed with success in one union shop may interest members of this Society. I make no extravagant claims for the method other than that it has worked in a few instances, and as long as it does so, I shall continue to use it until I discover something better. Time study, in the first place, is undertaken without any idea of regimentation, restriction, minute direction, or harmful speeding-up of workers' movements. It thus becomes an instrument for: first, removing obstacles that prevent the worker from giving his best to work; second, providing a technical comparison between different ways of performing operations, such, for instance, as a choice between two different available machines; third, determining the output capacities of operations for order scheduling purposes, and fourth, providing an equitable basis for piece work prices where these are used. The confidence and co-operation of labor must be won at the start by fairness, open dealing and positive recognition of the union. Unit times are taken during the observation and these, wherever possible, are compiled into standard data, so as to save unnecessary duplication of time study effort in the event of future rate setting on similar work. The operation instruction sheets for shop use are drawn up as simply as possible and show no irrelevant information. Component stages in the operation are indicated in a somewhat *general* way so as to convey no suggestion that the worker's movements are regimented or must be performed automatically, each in a given time. Elementary or unit times, of course, are omitted for a similar reason. In most cases a *total* standard time for the operation, together with the corresponding number of pieces per hour, are indicated for the workers' information. Finally, and I consider this last detail immensely important, the operation instruction sheet is a fluid, evolving record, subject to change as often as the worker thinks out a demonstrably better way of performing the operation. It has been



STANDARD OPERATION INSTRUCTION SHEET

PART NO. 21955 NAME CRANKCASE MAIN SECTION PART NO. 21955

DATE Nov.1,1928 MATERIAL CHANGE NOS. [redacted] SHEET NO. 9

MACHINE 3 ft. SENSITIVE RADIAL DRILL DEPT. NO. 413 OPER. TIME 4.0 min. piece 15.0 pieces per hr. OPERATION No. 1312

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER
Drill (3) 11/32" dia. holes x 3/64" deep	Drill Jig & Base	21888-T-61
(Grind point of Std. Drill to 7°)	11/32" HS Drill	
Remove jig	point ground to 7°	Std
Countersink all holes slightly to remove burr	Drill point gage	21888-T-66
(flange face side only)	Burring Tool	21888-T-67
Use Hand burring countersink		
Refer to B/P 21955 for proper data as to speeds and feeds.		

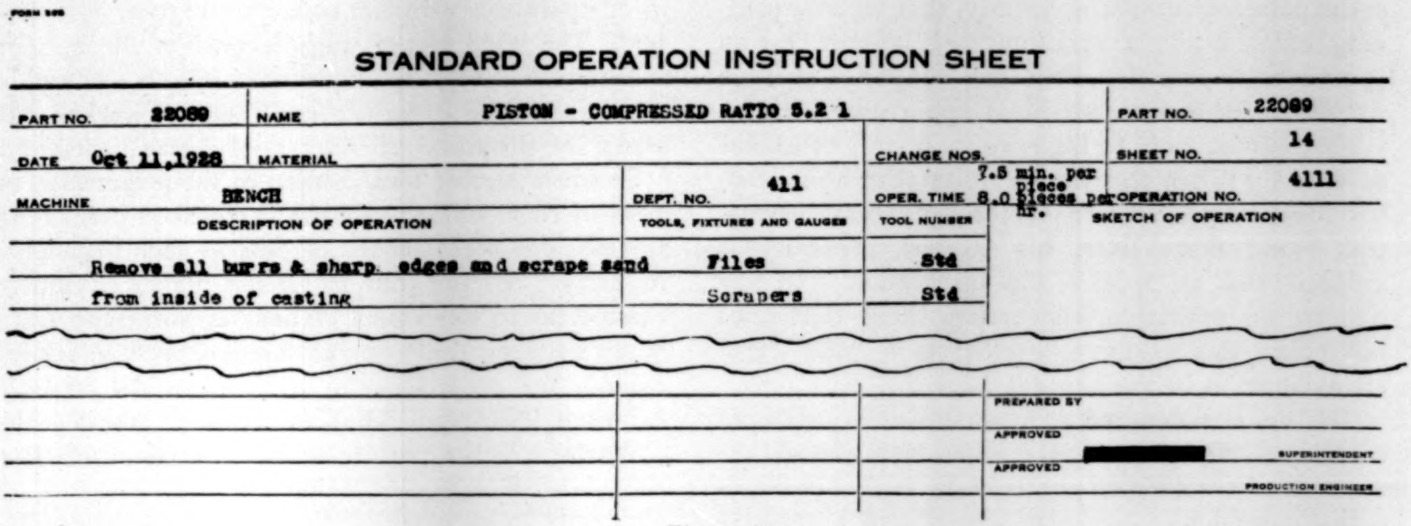
SKETCH OF OPERATION

PREPARED BY [redacted]

APPROVED SUPERINTENDENT

APPROVED [redacted] PRODUCTION ENGINEER

Figure 1



FORM 505

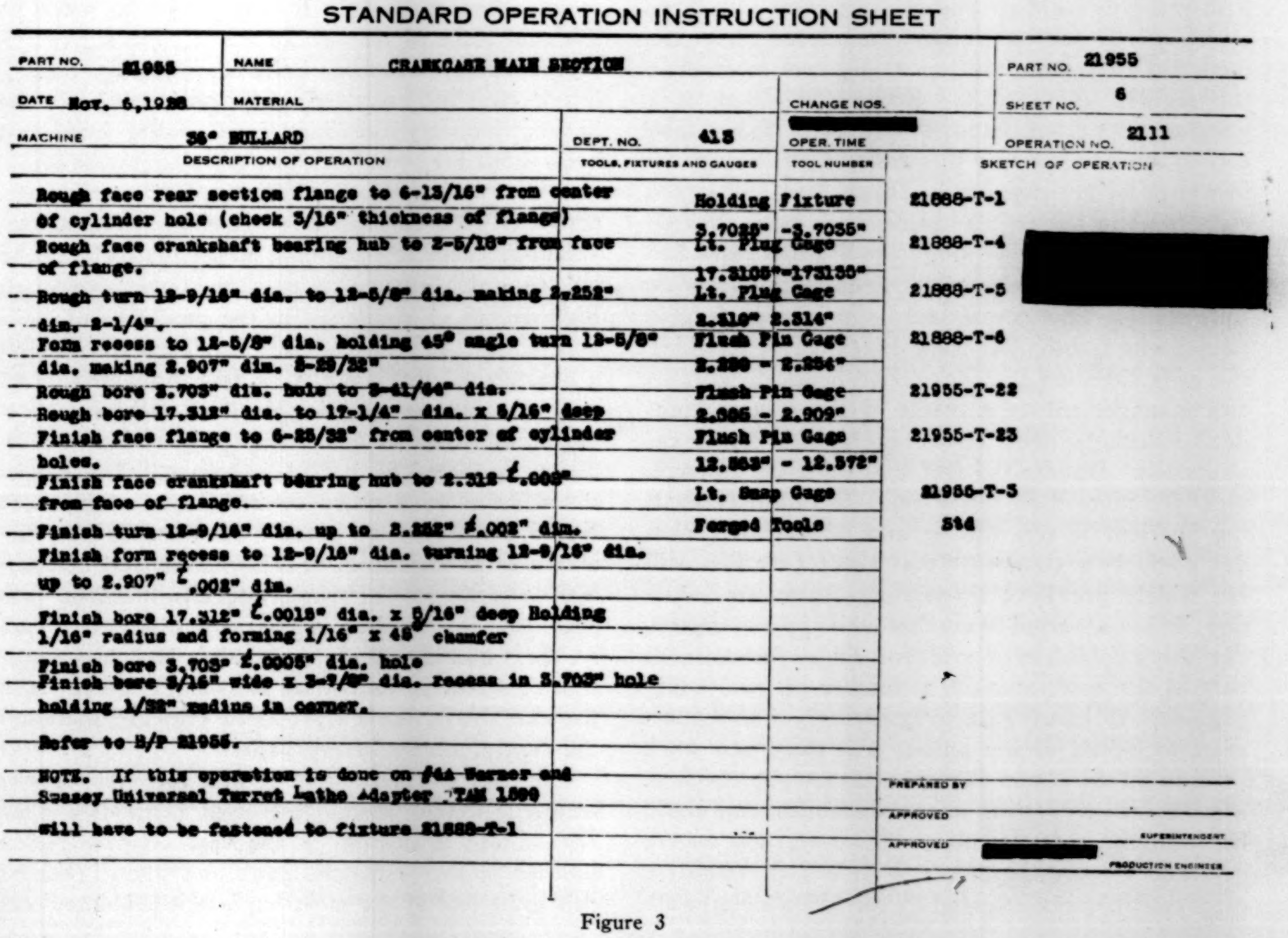
STANDARD OPERATION INSTRUCTION SHEET

PART NO. 22069 NAME PISTON - COMPRESSED RATIO 5.2 1 PART NO. 22069
DATE Oct 11,1928 MATERIAL CHANGE NOS. SHEET NO. 14
MACHINE BENCH DEPT. NO. 411 OPER. TIME 7.5 min. per piece 8.0 pieces per hr. OPERATION NO. 4111

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER	SKETCH OF OPERATION
Remove all burrs & sharp edges and scrape sand	Files	Std	
from inside of casting	Scrapers	Std	

PREPARED BY
APPROVED [redacted] SUPERINTENDENT
APPROVED PRODUCTION ENGINEER

Figure 2



STANDARD OPERATION INSTRUCTION SHEET

PART NO. 21955 NAME CRANKCASE MAIN SECTION PART NO. 21955
DATE Nov. 6,1928 MATERIAL CHANGE NOS. [redacted] SHEET NO. 6
MACHINE 36" BULLARD DEPT. NO. 415 OPER. TIME OPERATION NO. 2111

DESCRIPTION OF OPERATION	TOOLS, FIXTURES AND GAUGES	TOOL NUMBER	SKETCH OF OPERATION
Rough face rear section flange to 6-13/16" from center	Holding Fixture	21888-T-1	[redacted]
of cylinder hole (check 3/16" thickness of flange)	3.7025" -3.7035"		
Rough face crankshaft bearing hub to 2-5/16" from face	Lt. Plug Gage	21888-T-4	
of flange.	17.3105"-173135"		
Rough turn 12-9/16" dia. to 12-5/8" dia. making 2.252"	Lt. Plug Gage	21888-T-5	
dim. 2-1/4".	2.310" 2.314"		
Form recess to 12-5/8" dia. holding 45° angle turn 12-5/8"	Flush Pin Gage	21888-T-6	
dia. making 2.907" dim. 2-29/32"	2.250 - 2.254"		
Rough bore 3.703" dia. hole to 3-41/64" dia.	Flush Pin Gage	21955-T-22	
Rough bore 17.312" dia. to 17-1/4" dia. x 5/16" deep	2.905 - 2.909"		
Finish face flange to 6-25/32" from center of cylinder	Flush Pin Gage	21955-T-23	
holes.	12.563" - 12.572"		
Finish face crankshaft bearing hub to 2.312 ±.002"			
from face of flange.	Lt. Snap Gage	21955-T-3	
Finish turn 12-9/16" dia. up to 2.252" ±.002" dim.	Forged Tools	Std	
Finish form recess to 12-9/16" dia. turning 12-9/16" dia.			
up to 2.907" ±.002" dim.			
Finish bore 17.312" ±.0015" dia. x 5/16" deep Holding			
1/16" radius and forming 1/16" x 45° chamfer			
Finish bore 3.703" ±.0005" dia. hole			
Finish bore 3/16" wide x 3-7/8" dia. recess in 3.703" hole			
holding 1/32" radius in corner.			
Refer to B/P 21955.			
NOTE. If this operation is done on #4A Warner and			PREPARED BY
Swasey Universal Turret Lathe Adapter TAM 1890			APPROVED SUPERINTENDENT
will have to be fastened to fixture 21888-T-1			APPROVED [redacted] PRODUCTION ENGINEER

Figure 3

my experience, almost uniformly, that when a planning office sends a machine tool lay-out, or an operation instruction, into the shop the average worker, if he has the slightest opportunity, begins almost immediately to improve on it, and continues to do so. When the worker feels that he is contributing to preparation of the operation instruction along these lines, his interest presently is aroused and he studies the instruction. In my opinion an operation instruction sheet that does not enlist the worker's interest is a "dud" that should not be in the shop at all.

The development of a joint union-management control over wage incentive rates, in organized industries where no such control now exists, provides a third problem. Not long ago, I had a remarkable object lesson in the necessity for some such joint control, as I watched the time study department in a large New Jersey plant nibble at piece work rates, for no other reason than the fact that a few highly skilled workers, by dint of exceptional energy and assiduity, so increased their outputs that they were earning 50 per cent more than the regular union scale. Because five out of a gang of about one hundred and fifty skilled men earned an increase over this amount, the individual in charge of the time study department authorized reductions in the regular piece work rates of from 15 to 33⅓ per cent, although the original rates had been established only after careful and accurate time study. This act, to call it by its disagreeable name, was fraud. My task consisted of handling the ugly situation that developed between workers and management as a result of the absurd blunder. Workers need protection against such exploitation. Despite the fact that scientific management for more than thirty years has been combating unscientific rate setting and rate cutting, candor compels a statement that these practices still are widely prevalent throughout American industry. It has occurred to me that international unions, like the machinists or molders, could maintain, as part of the new function, a number of time study engineers to investigate irregularities of this character in behalf of the union. All the piece work rates in all the plants cannot, of course, be checked. *Methods* of rate setting in each establishment could be brought under scrutiny, however, and where grievances were reported, a few representative rates might be investigated by the union's engineers in co-operation with the concern's regular rate setters. The wide use of wage incentives throughout industry is likely to continue for a considerable time, and while it does, a joint control worked out along the proposed or other lines seems necessary.

Problem number four consists of the preparation of a set of representative standard methods describing the efficient performance of jobs in each organized industry. All the jobs in all the plants obviously cannot be so described. There is sufficient similarity between these operations, however, to render feasible the preparation of a set of *model* methods for each industry. Thus in foundry practice the operations of the pattern shop, core room, melting room and molding floor have a high measure of similarity in all establishments. This is true, also, of the machine shop type of industry where the major operations and machines—drill presses, plain and turreted lathes, milling machines, planers and shapers, semi-automatics and automatics — are found in most shops. In every cotton, wool or silk mill some of the operations of spinning, winding, warping, weaving, knitting, printing, bleaching, dyeing and calendering are performed. In the hatting industry the operations of the front and back shops are found in every plant, great or small. Our wire mills conduct, almost uniformly, the same activities—rod rolling, wire drawing, stranding, insulating, twisting, braiding, impregnating, and so on. A quick survey of most industries reveals a high degree of similarity in the processes of each, and makes the preparation of model methods seem a practicable undertaking. These standards, obviously, would be evolving records, subject to revision as often as advancing progress in the industry rendered a change necessary. The educational value to a union of such a set of methods would, I am sure, be great. They would be available also as standards of information and comparison in conferences about production methods, outputs, working conditions and other matters. Finally, they would provide each union with a foundation of scientific industrial knowledge, essential to the exercise of labor's proposed critical function—the central theme of my paper.

The last problem that I will refer to at any length is that of developing joint methods for the release and utilization of the vast creative potentialities of the industrial rank and file. I believe this to be one of the most important problems confronting industry today. So much has been written on this subject during recent years, and so many interesting papers dealing with it have appeared in the BULLETINS OF THE TAYLOR SOCIETY that I would be carrying coals to Newcastle if I spent much time now in exploring its underlying philosophy. In a general way, however, it may be stated that there is a growing realization throughout society that the life of the average worker in most of our industries, instead of providing scope for the greatest possible release and development of his inner nature, is repressive of the best part of that nature, that is, the dynamic urge and necessity to create. Inasmuch as this creative urge is present in every human being in some measure, and finds its roots in the fundamental depths of human nature, we ignore it or deny it only at our peril. Yet this, in effect, is just what industry has done ever since the advent of the machine, and until comparatively recent years industry has been abetted and justified in the process by the nineteenth century philosophy of materialism. The awakening to which I have referred implies, among other things, increasing recognition of the fact that this repression of the worker's mental life is doubtless unjustifiable on economic grounds alone, for it involves a vast waste to industry of potential creative power—the power of the worker to learn, think, originate, suggest ways and means, and in every practicable way to participate in creative production.

In the face of daily evidence that machine industry offers considerable opportunity for the play of initiative and skill among workers, I find myself baffled by the extent to which the opposite point of view seems to prevail in current literature. Several books that I have read during recent years accept the conclusion that a mechanistic working existence for the worker is an inevitable condition of our mechanical age; and they lead on to the corollary that, as this is so, the worker's compensation must be found exclusively in an enriched life apart from his work. This better life is to be gained in shorter hours of work and a greater share in the products of industry, rendered possible by increased industrial productivity through new mechanical and technological developments. There is little doubt that the latter advantages will come progressively, in the manner described. But I cannot see that the worker is doomed to become a robot or mechanical man in modern industry. Abundant necessity for individual skill and initiative, of a *new character and direction,* still exists, and, I believe, always will exist. Actual experience in developing initiative among workers, moreover, leads me to the conclusion that modern industry by neglecting somewhat this aspect of industrial organization, is wasting one of our most valuable social assets.

There is general agreement today among many managers as to the theoretical soundness of the foregoing. An increasing number of industrial establishments, also, in a groping sort of manner is using various expedients in the hope of salvaging some of this great, incalculable waste. Thus we have today such organization details as joint-job-analysis committees, suggestion committees, workers' suggestion boxes and kindred features. The Baltimore and Ohio plan of railroad-union-management co-operation is probably the outstanding vindication, thus far, of the worker's need for creative freedom in the performance of his work. This development, with its myriad of constructive suggestions submitted by workers to their joint committees, is in the very essence of the new industrial spirit of which I speak. Much experimentation along these lines still lies ahead, but I feel safe in predicting that this will be one of the most important directions of progress in the industrial world of tomorrow. So strong is my conviction that this is so, that I would like to propose a new principle to be added to those already included in our present conception of scientific management. This principle might be stated as, "The mobilization and organization, by every possible means, of the worker's natural interest in his work, and of his creative power."

A good start in this direction has been made in a few plants in which, during recent years, I have had the privilege of assisting. These establishments now have the joint committee and suggestion collecting features that I alluded to in the preceding paragraph. Most important, however, is the inevitable improvement that has taken place in each plant's working atmosphere by the mere fact that management has recognized the functional importance of the wage earner as a creative member of the organization. This has been true so uniformly, that whenever I am asked now how freedom of initiative may best be encouraged among workers, I am tempted to reply, "Just go and do it."

The first move, however, consists of inaugurating a special canvass of the workers for original, practical ideas tending toward the development and improvement of each man's job. The proposals accumulated in this way are then examined by management, either in the planning office or, preferably, by a special joint committee representative of workers and management. Results from this opening canvass are then used as economic justification for a more regular and systematic canvass through a permanent joint committee. In the plants that I have referred to, the worker, when he thinks up some minor improvement in his job, feels perfectly free to suggest it to his department foreman. If, in the foreman's judgment, the idea is a good one and its adoption practicable, he has power to approve the change. Where the worker considers his proposal an important one, meriting higher and more private consideration, or where the foreman knows that ultimate approval must come from a more responsible authority, the suggestion is submitted to the joint committee. For a number of years now, I have recorded the details of outstanding proposals coming from workers in these plants and my collection of cases now amounts to a great number. I am submitting the best twenty-five of these to the Taylor Society, and if any of my audience is of the opinion that the potential creative contribution of workers to industry in this machine age is unimportant, I can only suggest that he scrutinize these cases with care.

Labor's most pressing problem unquestionably is that of organizing the great residue of unorganized workers throughout industry. While I know that organizing activity must of necessity employ a shifting strategy and is thus, in its nature, opportunistic, I cannot escape a conviction that labor organizers would be greatly assisted by a methodology similar to the scientific management approach. A scientific record of different kinds of organization activity with their results, a fact finding survey of unorganized territory along scientific lines, and the utilization of modern graphical methods for the representation and analysis of these facts, all would seem to possess positive utility in furthering organization campaigns. I had fleeting evidence, about a year ago, that some progress already has been made in this direction. While sitting in the outer office, awaiting an interview with an A. F. of L. state organizer, I noticed hanging on the wall opposite me two large Gantt wall charts. I was about to step across and examine them surreptitiously, when the door suddenly opened and I was summoned inside for my conference. I have never discovered just what facts they were visualizing. In any event, there is little doubt in my mind that the scientific compilation and representation of facts and figures relating to organization activities, as well as other major activities of labor, can be of great assistance to trade union officers and to the labor movement as a whole.

What specific gains will accrue to labor through development and exercise of the new critical function that this paper proposes? The proposal involves a considerable appropriation and expenditure of trade union funds, and its pragmatic soundness from labor's standpoint must be clear before the unions can be expected to regard it with much seriousness. These gains, as I see them, fall into five categories. *First,* there will be an economic gain through the impetus that will be given to progressive waste elimination throughout industry. The ill effects of wasteful management bear heavily on the worker in his dual capacities as wage earner and consumer. *Second,* labor will gain an adequate instrument through which to cope with abuses in modern management practice. The science of management is spreading throughout America and Europe. Abuse of its principles by unscrupulous employers and managers, to the disadvantage of labor, undoubtedly will occur. Labor must be prepared to meet such abuse on its own ground. *Third,* there will be a moral gain through increased prestige that will accrue to organized labor in its warfare on an obvious social evil. Modern civilization is at war with waste. The unions, therefore, by taking the initiative in this crusade, must gain in time the support of thoughtful people everywhere. *Fourth,* by employing engineers in the proposed departments wherever necessary, labor will gain a new affiliation with the engineering profession. With industry and management on their present technological level the labor movement needs the engineer. I might add, as one conversant with the economic conditions of the average member of my profession, that the engineer needs the labor movement. The *fifth* and last, and, to my mind, most important gain is one that embraces the preceding four and provides the final argument in favor of more extensive participation by labor in the management of industry. *Labor will gain greatly in power by such participation.* Accumulation of social power must needs be the great objective of organized labor at its present stage of progress. Greater social power can come only by bringing into active union membership, unorganized non-union workers wherever they are to be found, and by an increased constructive utility of the trade union in its relation to society as a whole. This increased utility can be gained only by a correct interpretation and utilization of tendencies in an industrial world that has passed through a great mechanical and technological revolution. Handicraft industry has gone. It has been vanishing slowly from occidental gaze for a century or more. The ideology that grew up and flourished around handicraft has survived on into our world, but now it too is rapidly passing. Labor faces a new industrial set-up. It cannot afford to lag behind while industry presses ahead. Should it do so, presently it will lose power and dwindle away in an unfamiliar world. The new function that I have proposed is designed to provide a safeguard against any such eventuality, and to establish the nucleus of an organization feature by virtue of which labor can maintain and increase its social power in the industrial world of today and of tomorrow.

Workers Participation in Creative Production
Twenty-five Selected Cases

Case 15—*J. C. Olsen.* Metal working plant, December 1921. A hand screw operator suggested that piston pins be machined from seamless steel tubing instead of solid bar stock. Existing practice consisted of drilling and reaming a solid steel bar of one and a half inch diameter. By the use of steel tubing, drilling and reaming times on each piston obviously were much reduced. The standard time to finish single piece was reduced from 24.0 minutes to 10.3 minutes by this development.

Case 16—*L. Curtis.* Metal working plant, January 1922. Pratt and Whitney turret lathe operator suggested that bronze valve guides be machined from bar stock instead of from individual detailed castings. By the existing method, these valve guides were cast separately, and then machined to the proper dimensions on a turret lathe. By using bar stock the molding operation on individual pieces was done away with and a great saving effected in the manufacturing cost of these parts.

Case 17—*J. De Young.* Metal working plant, September 1923. Store room attendant wrote to the management suggesting that materials, parts and subassemblies be placed in bins having a convenient numerical sequence, and that assembly order sheets be made out in a similar numerical sequence. By issuing assembly sheets in a certain numerical order and arranging storage bins in corresponding numerical order, much time and labor would be saved in stock rooms as the store keeper, after a quick glance at an assembly sheet, would know at once just what aisle, tier and bin to go to for any stipulated material or part. This worker embodied in his memorandum a comprehensive scheme of symbols and numbers to support his idea. The general scheme was approved by the management and adopted.

Case 20—*A. Kufta.* Metal working plant, December 1927. Warner and Swasey hand screw machine operator suggested and developed a forming tool for use in producing steel valve guides at his machine. This tool, mounted on the back cross-slide, accomplished the work formerly done by five separate tools in the turret, viz., two turning tools, an undercutting tool, a facing tool, and a chamfering tool. The productivity of the operation was more than doubled by this development.

Case 9—*J. Huber.* Metal working plant, October 1928. Milling machine operator developed a milling vise by means of which seventeen bars of key stock could be held in close parallel and seventeen keys cut off simultaneously. These keys formerly had been cut off singly. An increase in output of about 600 per cent followed this change.

Case 11—*W. Wyring.* Wire and Cable Company, Yonkers, November 1920. Gang boss in wire stranding department developed a way of overcoming frequent breaks in wires during the stranding operation. These breaks, each of which necessitated a stoppage of the large stranding machine until the broken ends could be brazed, long had been a source of heavy expense and annoyance to the management. Individual wires, sometimes to the number of several hundred, depending on the size of the cable, passed through guide holes arranged in concentric circles about the surface of a steel disc, and then angled down to the strander die. This worker observed, one day, that the outer circle of wires bore heavily against the inner edge of the guide hole, this contact with a relatively sharp surface, combined with the tension on the wire, probably cutting the latter while stranding was in progress. He removed the stranding disc, took it to the machine shop, and had the concentric holes moved nearer to the center of the disc, thus lessening the angle of tension on the outer circle of wires. This solved the problem, the delays through wire breaks being virtually eliminated. The saving was very great. The worker responsible for it, so far as I know, received no kind of recognition for his achievement.

Case 28—*H. Wankling.* Metal working plant, February 1928. Set-up man was given an operation instruction sheet stipulating that the operation of chamfering a certain type of steel washer be performed on a No. 2 Warner and Swasey hand screw machine. This necessitated placing each washer in a special chuck, using a chamfering tool in the turret, and moving the turret to the work while machining each piece. The set-up man suggested that the job be transferred to a simple speed lathe where the chamfering tool, mounted in the head of the machine, could run continuously, the washers being held against it, one by one, by the machine operator. This change eliminated the time spent in stopping and starting the machine between pieces, as well as the time consumed in advancing and withdrawing the turret by the former method. The standard time to chamfer this kind of washer was reduced from .75 minutes to .25 minutes, equivalent to an increase in output of 200 per cent through this development.

Case 29—*W. Tokars.* Metal working plant, February 1928. Operator worked on a Leland and Gifford four spindle drill press, drilling carburetor wrenches. The operation instruction furnished by the production office stipulated that each piece must be laid out by the drill press operator, the points for each of four holes spaced at right angles on four sides of the piece, being located with a scale and spotted with a center punch. The drill press operator found this method too slow and laborious, so he thought out a better one. Procuring a drilling vise from the tool crib, he used it as a locating fixture, placing two steel blocks in the vise as stops to hold the work in proper alignment. By the use of this fixture the necessity for laying out each piece was eliminated, and the standard time for the operation reduced from 8.6 to 3.5 minutes.

Case 30—*Otto Kern.* Metal working plant, February 1928. Operator, machining bronze bushings on a No. 6 Warner and Swasey hand screw machine, had been instructed to use a facing and cutting off tool on opposite sides of his cross-slide; and a spotting tool, a drill, a reamer, a roller turner and a chamfering tool in his turret. On his own initiative, this operator developed two combination tools. The first, a composite tool in his turret, combined the operations of spotting and rough turning; the second, a forming tool on his cross-slide, combined the operations of finish turning, facing and chamfering. By accomplishing with two tools operations formerly done with five separate tools, the standard time per piece was reduced from 9.0 to 5.0 minutes.

Case 31—*W. Groves.* Metal working plant, February 1928. Lathe hand, counter boring aluminum pistons on a Hendey lathe, sought and received permission to transfer the operation to a fast drill press. The time necessary to finish a piece on the lathe was 6.0 minutes. The standard time per piece on the drill press is now 2.0 minutes.

Case 32—*B. Whiteside.* Metal working plant, February 1928. Operator, machining steel pipe flanges on Cleveland automatics, developed tools by means of which washers of a similar stock size could be produced simultaneously with the flanges. The feature of this idea consisted of two parallel cutting-off tools mounted on a common cross-slide tool post. While the first tool cut off a pipe flange, the second one was cutting off a washer. These washers formerly were made on a second automatic which was released for other work by virtue of this development.

Case 37—*L. Parkins.* Metal working plant. One of the hand screw machine operators had listened to many complaints relative to reamers coming from tool cribs dull and often with chipped edges. One day, while standing at the crib window, this worker noted some lengths of old rubber hose lying about on the floor. He asked the crib attendant what purpose this hose was serving. "No purpose at all," the attendant replied, "It is full of leaks and I intend to sell it for junk." "Don't do that," said the hand screw operator, "Cut it up into suitable lengths, and use the latter as a protection for the reamers while they lie on the crib-shelves. Put each reamer into a hose length and reserve whatever lengths are left over for future reamers." This idea, which was adopted, effected a very noticeable improvement in the condition of reamers throughout the shop.

Case 40—*J. Hannah.* Metal working plant, March 1926. Lathe hand, turning the outside diameter of aluminum pistons on a small Porter and Cable lathe, sought and received permission to perform this operation on a large Potter and Johnson semi-automatic turret lathe. On this heavier machine it was possible to use a greatly increased feed. The original time for turning a single piston on the Porter and Cable lathe was 20.0 minutes. *This time was reduced to 4.0 minutes on the Potter and Johnson.* For effecting this great economy, the worker received, I am glad to report, a substantial increase in his hourly wage rate.

Case 44—*G. S. Robinson.* Metal working plant, April 1928. Landis grinder hand performed a grinding operation on two separate surfaces of a steel shaft. He had been instructed to grind the first surface, then reset his wheel and grind the second surface from a new setting. By devoting thought to his work he finally developed a new shape of grinding wheel by means of which he was able to finish both surfaces from a single common setting. The new method quickly became accepted practice for this operation. Elimination of the second set-up reduced the standard time necessary to complete a piece from 10.0 minutes to 5.0 minutes.

Case 45—*Tower and Handerson.* Metal working plant, April 1928. An operator and a helper running a group of four Gridley automatics, on their own initiative suggested that they could take on another machine in addition to their regular quota. For several months now they have been successfully operating five of these machines without any increase in down time over the four machine basis.

Case 47—*B. Whiteside.* Metal working plant, April 1928. Automatic screw machine operator, running a group of Brown and Sharpes, developed a tool which greatly increased the output of push rod ball ends from these machines. Existing practice consisted of profiling and cutting off these parts on Brown and Sharpe automatics, and then sending them to hand screw machines where the more exacting operation of forming the ball was performed. Owing to the relative slowness of the hand screw machine operation, the output of ball ends produced in this manner was only 150 per day, a figure much below the output possibilities of a Brown Sharpe automatic, if an adequate all-forming tool could be developed for the latter machine. This worker applied his skill and wits to the problem, and presently came through with a tool for the automatics that formed a perfect ball radius. Since then this operation in its entirety has been performed on Brown and Sharpe automatics. The output on the new basis is 800 per day, an increase of 430 per cent over the old method.

Case 48—*B. Whiteside.* Metal working plant, April 1928. The steel ball ends described in the preceding case passed next to an Ott plain grinder where the ball radius was ground to a careful finish. Each piece, at this stage, was held in a special chuck, the grinder operator holding the chucked ball end against his grinding wheel, and slowly revolving the work to and fro through 180 degrees until he obtained a satisfactory finish. The maximum output obtainable from a single grinder in this way, was 50 pieces per day. The same worker, who already has effected the economy described in the preceding case, suggested that the operation be transferred to a Cincinnati centerless grinder where a special radius form grinding wheel might be developed and used. Such a wheel was developed eventually, and it entirely eliminated the time formerly consumed on the Ott grinder in moving the work to and fro on the stone. *The output of these parts from the centerless grinder is now 2,000 per day, an increase of 3,900 per cent over the old method.*

Case 53—*W. Yeager.* Metal working plant, May 1928. A tool crib attendant noticed that specifications called for 3/64 inch drills which had to be made up specially at a cost of $11.95 per dozen. He submitted a suggestion that No. 56 drills, a stock size obtainable at $1.71 per dozen, be substituted. This worker, in his memorandum, called attention to the fact that as there was a difference of only .0004 inches in the sizes of the two, the stock drill probably would serve. This recommendation was adopted and its proposer received a reward.

Case 57—*F. Dutnak.* Metal working plant, May 1928. A hand screw machine operator developed a special chuck by the use of which the machining of water pump covers, formerly done on Fox lathes, could be transferred to a No. 4 Warner and Swasey universal. Through the greater accuracy of the universal, it was possible to obtain a satisfactory finish to these parts in considerably less time than on the Fox lathe. The standard time per piece for this operation was reduced from 33.5 minutes to 17.0 minutes by this development.

Case 58.. Metal working plant, May 1928. The production department has sent operation sheets into the shop stipulating that two machining operations on aluminum gear housings be performed on a straight lathe. The first operation consisted of rough and finish facing a hub—the second one consisted of rough and finish turning the hub and then back-facing the flanged end of the housing. Each of these operations required a special set up. A hand screw machine operator suggested that both operations be combined in a single hand screw machine operation, in this way eliminating the second set-up, as well as a considerable amount of unnecessary handling time spent at the lathe. To support his idea, the worker suggested a new way of holding the work on an adapter so that all machined surfaces would be made accessible to the necessary cutting tools. This development was successful and the new method was permanently adopted. Standard time for machining a single housing by the old method was 11.0. This time was reduced to 5.0 minutes by the new method.

Case 65—*B. Whiteside.* Metal working plant, June 1928. Operator running a group of Cleveland automatics, devised and suggested equipment by which the machining of steel clamp nuts, formerly done on Jones and Lamson engine lathes could be transferred to the automatics. When this change was permanently adopted, it increased the output of these parts from 50 pieces to 200 pieces per day, an increase of 300 per cent.

Case 66—*B. Whiteside.* Metal working plant, June 1928. Operator running Gridley automatics suggested and developed necessary cutting tools for the machining of steel packing nuts on the automatics. Former practice had consisted of making these nuts on an engine lathe, and 40 pieces per day was regarded as a fair average output. On the automatics production was increased to 500 per day, a great increase in productivity over the old method.

Case 67—H. Edge. Metal working plant, June 1928. A drill press operator running a Burke sensitive drill had been instructed to drill a hole in the hubs of aluminum nuts, locating the center of each hole with a scale and spotting it with a center punch before drilling. It took 2.0 minutes to finish a piece by this method. This worker thought out and prepared the sketch of a drilling jig which located the center as soon as the nut was clamped into position in the fixture. This device was adopted and it reduced the standard time per piece from 2.0 minutes to .5 minutes.

Case 70—H. Wankling. Metal working plant, June 1928. According to the operation layout prepared by the production engineering department, two machining operations on steel knuckle pins were performed on different machines. The first operation, consisting of facing, turning, drilling and undercutting, was accomplished on a hand screw machine; the second, consisting of undercutting a groove and chamfering, was done on an engine lathe. A set-up man working on a hand screw machine conceived the idea of combining these two operations into a single hand screw machine operation. He then developed the necessary turret and cross-slide tools to make the change effective. This new manner of working was entirely successful, and reduced the standard time per piece from 6.5 minutes for both operations done separately, to 4.2 minutes for the single operation.

Case 71—J. Piaja. Metal working plant, 1926. According to the standard operation sheet, aluminum cylinder pads were faced off with a face milling cutter, mounted on the spindle of a Hudson universal boring mill, and then were bored out in another operation on the same machine. The operator of this machine suggested that a combination spot facing and boring tool be substituted for the milling cutter, the proposed tool thus being brought in contact with the entire surface at once, instead of having to travel across it; and in addition, performing the boring operation as an unbroken continuation of the facing operation. This idea was tried out successfully and adopted, and it increased the productivity of the operation by about 800 per cent.

Discussion

Gustave Geiges.[2] I am very glad of the opportunity of presenting labor's views to the Taylor Society and its friends. The American Federation of Full Fashioned Hosiery Workers, the organization which I represent, clearly recognizes the need for co-operation with management in every problem which the full fashioned hosiery industry must face. We, therefore, welcome the engineer and the scientifically trained expert in industry, because we feel that the greater knowledge which these men can bring to this task will, in the long run, aid both capital and labor to find a more reasonable and certain method of reaching a rational and practical system of mutual assistance in the conduct of industry.

The hosiery workers' union welcomes the technical expert in industry. We have just recently sought the professional services of certain distinguished members of the Taylor Society in an effort to solve the problems of our industry without resorting to a strike and the sort of conflict which has usually been an almost inevitable feature of disputed industrial situations, involving differences of opinion on matters of wages and working conditions. Progressive elements in the modern trade union movement believe that strikes, like wars, must be eliminated if social progress is to be maintained in a complicated industrial society such as we are living in today. We must develop not only a clear understanding in industry of the rights of both employer and employe, but we must create the opportunities which will translate understanding into useful action.

Most of the employers with whom I have come into contact during the past ten years agree that it would be advantageous for their industry if all parties in the industry were organized — workers and manufacturers alike. The difficulty, however, is to convince the individual employer by reasonable argument to accept organization of his employes, when the workers in the entire industry are still not unionized 100 per cent.

The American Federation of Full Fashioned Hosiery Workers has demonstrated its willingness to meet the needs of a competitive business system and has been alert at all times to adapt itself to the present industrial problems resulting from constantly increasing production.

Let me digress for a moment and make clear the difference between full fashioned hosiery and other types of hosiery manufactured. First of all, there is the difference in the method of manufacture. The seamless, or circular, knit is knitted in tubular form, while the full fashioned hose is knitted as a piece of flat fabric shaped to the limb of the wearer. This is the difference in techniques, but there is a greater difference in the actual composition of the full fashioned hosiery industry as compared with the seamless industry. The use of full fashioned hosiery is increasing, while the use of seamless hosiery is tending to decrease. The full fashioned hosiery knitting machine is much more expensive than the seamless and is much more productive.

The average full fashioned manufacturing plant is probably more efficiently operated than most factories, due to the fact that the various operations are performed by specialists. The knitters, who are the male operatives, knit the fabric, which is then made into a finished garment in a series of operations performed largely by female workers. The toppers, almost invariably women, are a connecting link in the process as they assist in transferring the leg portion of the hose to the machines on which the foot portion is knitted. Each worker in this chain of operations is highly skilled and almost all are paid by the piece. This tends to increase production and the sense of responsibility of the worker toward his or her job.

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[2] President, American Federation of Full Fashioned Hosiery Workers, Philadelphia, Pa.

The question of eliminating waste in the full fashioned hosiery industry is of the highest practical importance because the cost of the silk is the largest single item in the cost of manufacture, an item greater than labor cost. By increasing the quality of workmanship the operatives can make savings which represent large sums of money over a period of a few months. The Taylor Society has published extracts from a speech I delivered describing our campaign to have the workers eliminate waste wherever possible. Our union has never sought to limit production or to hamper efficiency systems by insisting on obsolete trade customs. We have worked unceasingly, and with much success in those plants where management has co-operated, to improve the conduct of our members in the mills. We have worked, for instance, on the matters of regularity, care of machines, and others of greater or less importance. Through our shop committees we seek to adjust all minor shop troubles relating to personnel, in the speediest manner possible and with little formality or friction.

We have made every effort to study our industry, both from the employers' point of view and our own, and have striven to educate the rank and file of the union to the conditions which our industry faces in the present complicated business and industrial system. During the past two years we have attempted to establish some sort of a permanent conference board of the union and the employers in our industry and to set up some permanent machinery for the arbitration of questions under dispute.

I can refer to statements by the employers in the Philadelphia district regarding the attitude of the organization on the wage matter. In an effort to encourage the employer who uses union help to expand his plant in non-unionized districts we revised our price schedule to enable the manufacturer paying the union scale to compete successfully with the employer who is in the anti-union or low wage class.

Some here may wonder why it is that a union as reasonable as ours should be conducting strikes which have become nationally prominent. In every case where trouble has arisen in our industry, we have been forced to fight either because our workers were locked out or because questionable methods were used to force men to drop their union membership. Take for example the Allen-A situation in Kenosha, Wisconsin. It is a disgrace to American society that the group of well educated young, native born workers employed by that wealthy corporation have been forced to walk the streets of Kenosha for almost a year. In Kenosha the employer had enjoyed substantial competitive advantages over other employers in the matter of wages, and because he had men running double shifts without extra compensation. Nevertheless, the Allen-A Company insisted upon forcing a fight with the union, using the so-called "two-machine system" as an issue. We contend the two machine system produces a greater number of workers than the industry can absorb. No two full fashioned machines can be operated by one mechanic. The plan used, therefore, is to have one artisan run the two machines with the assistance of one or more apprentices. The result of this system is a surplus of men wanting jobs as knitters. The Allen-A Company locked out its workers in an effort to scare them into resigning their membership in our organization. Court action against the workers followed, and fine and respectable citizens have been charged with violations of a federal injunction and sent to jail. Is this an atmosphere in which to develop an industry to higher standards of efficiency and orderly operation?

In Buffalo, New York, a group of young workers in the Duffy full fashioned plant were forced to strike because they refused to sign individual (commonly known as yellow dog) contracts.

In conclusion let me refer briefly to a fact previously mentioned, regarding the assistance my union has sought from technical experts who happen to be prominently connected with your Society. One substantial full fashioned concern which has been run on the so-called "open shop" basis, with union and non-union help working together, claims to be unable to pay the union scale of wages generally prevailing in the organized industry. We contend that, if this is the case, it is largely, if not entirely, due to the mistakes of management. This employer has consented to open his books and we are having a study made by impartial experts to see if we cannot adjust our differences on the basis of reason and fact. We believe that if we are given an opportunity to assist management in the plant under discussion, it will be possible to raise standards of efficiency materially, simply by improving the morale of the workers and by having them follow out certain simple and practical policies in handling their jobs.

Labor unions have progressed in an advancing age, but they have only given an indication of what they can accomplish for industry and a better society. The trade unions of the past, in spite of all their mistakes, have made an enormous contribution to the development of the industrial system. It is our hope that in the future owners, managers and those with scientific training will co-operate with the labor unions to find a practical and common sense way of working together for the best interests of each and for society as a whole.

William M. Leiserson.[*] I do not think that when we are considering social movements like trade unions and employe representation, it makes very much difference whether you can prove on some theoretical basis that one or the other is better calculated to promote the interests of employers, employes or the community. Most economists agree that in the abstract the union shop policy of the labor organizations (collective bargaining) is a sounder industrial policy than the so-called open shop policy, or the "American plan." Nevertheless, no person who is alive to the actualities of American industrial life will doubt that the open shop policy has made greater headway in this country than has the union shop or collective bargaining. When we recognize this fact, it does not at all mean that we approve of the open shop policy. Neither do we approve of everything that labor organizations try to include under their union shop policy.

It does not seem to me that a scientific person can contribute much to industrial progress by damning the general movements that contending parties attempt to promote under such titles as open shop or union shop. It seems to me that scientific people need to point out to all parties, to the community as well as to employers and to employes, the actual results to which the policies they are pursuing are leading. Our attention should be given to studying the specific things that each of the parties does or wants to do, regardless of whether these things are classified for partisan purposes under such titles as open shop, union shop, or any other slogan.

If employers have been able to whip the trade unions in most of the large industries by their open shop policy, how can anyone think that by merely proving in the abstract that company unions are not as good as trade unions, the employers will not be able to whip the unions still more effectively with their new device of employe representation? What I am driving at is the futility of proving in the abstract that company unions are not as good as trade unions. Whether they are or not makes very little difference. The real point is, are the employers with this new device that seems to concede the principle of collective bargaining and democratic representation in industry—are they able more effectively to prevent the spread of trade unionism among their employes?

I do not think that anyone who investigates the facts as they actually are can have the least doubt that trade unionism in this country is at a standstill, if not actually declining, in the face of the company union movement. I certainly will agree with you or with anyone else that this ought not to be. I should like to see something else happen; but what we think ought to be and what actually is, are two very different things. And as scientists we must clearly point out what actually is happening.

Now as I see it, what is happening with respect to company unions and trade unions is that the employers have discovered a method of making the open shop policy still more effective than it has been, by adding to it the device of employe representation. They are successful in this largely by dictatorial methods; that is, by the same methods that have forced and maintained the open shop policies in their industries. But this is not all of the story. Where they have found dictation and economic power not effective enough in accomplishing their purposes, the employers have conceded a measure of self-government to their employes, in order to get more efficiency and more co-operation. In making this concession, the employers have found it necessary at times to give the workers more money than they would have given under a straight open shop policy; but they have found that this paid not only in reduced costs but actually in winning more good will and cooperation from their employes.

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[*] Professor of Economics, Antioch College, Yellow Springs, Ohio.

The workers under these representation plans, on the other hand, also compare their wages with union earnings, and when they find they are getting more money under the representation plan, that is, when they get raises with reasonable frequency, the appeal of the union organizer that the union will get more money for them naturally loses much of its effectiveness.

But this, of course, is not the only reason why many workers prefer company unionism to trade unionism. A more important reason than wages is the archaic structure of American trade unions. Most of the workers in employe representation plans would have no place in a regular labor organization, and if a place were made for them, as sometimes happens, they would run into a lot of jurisdictional disputes. Of course, a labor movement properly organized could overcome this difficulty, but the fact is that, *right now,* many of the semi-skilled, unskilled and clerical workers in industry have reason to feel that they are doing better with the companies' organizations than they could do with the national labor organizations of this country.

Then again we must not forget our history. Most of the working people in the basic industries are immigrants and children of immigrants, or else green hands from the country, and there is also an increasing number of women and negroes. The history of the handling of these masses of workers by the trade unions of this country is not something to impress on their minds the fact that the trade unions are particularly desirous of promoting their interests. Most of them have had experience with unions which discriminated against them. If they were immigrants, the unions often kept them out of their organizations by charging high initiation fees or by other devices; if they were unskilled the unions often tried to keep them from getting jobs, because the skilled union men thought the unskilled were taking away their work; if they were women, the unions often discriminated against them in other ways. All of these things are a part of the memory and psychology of the great masses of employes who are not skilled mechanics and who make up the main body of workers in the company unions. When working people prefer company unions to the regular trade unions, all these things are back in their minds, and not only the matter of getting more for their money.

On top of all this, the development of personnel departments in industrial plants has given the employers a set of people to handle their labor who, whatever may be said of their weaknesses, are on the whole superior in leadership and management ability to most of the labor leaders of the country. These men know the psychology of the workers that has been built up by years of struggle over the closed shop and the open shop policies, over the introduction of the new classes of immigrant labor, women and other unskilled workers; and they know how to win the loyalty of their workers to industrial corporations, by means of employe representation and other kinds of welfare activities, much better than the ordinary labor leader knows how to win their sympathy or loyalty to the labor movement.

These are the facts, as I see them. If they are true, it does not do much good to point out that on general abstract principles, trade unionism is better for the workman, or even for industry as a whole, than company unionism. What is needed is to show the trade unions that this presents them with a new situation requiring the adoption of entirely new tactics, policies, and new forms of organization, if they are to meet the new strategy of the employers. On the other hand, it is necessary to point out to the employers as well that even if they should succeed in crippling the national trade unions so as to make them very largely ineffective, that does not necessarily mean that they will be able to have an entirely free hand. If there is something in the idea of collective bargaining and democratic representation in industry which cannot be worked out by plant organizations exclusively, then the chances are that these plant organizations will begin to branch out in times of stress and unite along industrial and national lines, so as to accomplish many of the purposes which the national unions are organized to accomplish.

F. A. Silcox.[4] As I sat at the meeting of the Taylor Society, listening in on the discussion of functions of workers' organizations and the place of these organizations in the industrial structure as they affect management, the workers themselves, the substitution of co-operation for competition and the like, it seemed to me that those presenting the papers on this subject were rather naive in the belief that they had discovered something new. Methods of approach, technique of co-operation, the function of workers' organizations, were but phrases carrying with them certain moral implications of what workers' organizations ought to do. Stripped of their verbiage the whole import of the papers presented was that workers' organizations should have more power but should use such power constructively—that is, in a way in which that power least challenges the established power. No one questions that an appeal to workers' organizations in their own interest is more effective to get results for the managers of industry than by exciting their antagonism. This is an obvious commonplace fact over which, it seems to me, it is quite unnecessary to waste many words. But this is exactly what so many words are wasted about. Everywhere throughout the discussions was the implication of the use of the power of the workers' organizations and then either a naive ignoring of the implications of that power or a fond idealistic hope that in spite of the play for power there was going to be a millennium of co-operation as a substitute for competition.

Without going into all of the details of the papers on the subject of workers' organizations, may I suggest that their functioning in the industrial structure be tested realistically on the basis of the following general formula?

1. That the acquisition of power is the primary thing that counts.

2. That every group, whether social, financial, industrial, ecclesiastical, or otherwise, must of necessity play for power, and to do this effectively must organize.

3. That the purpose of the accumulation of power is not wholly to accomplish an objective but to acquire more power.

4. That the play for power is the catalytic agent which keeps things in motion; therefore conflict and competition are desirable as vital agents in the promotion of progress.

5. That power knows no discretion, no matter what group has it—workers, employers, financial, social, ecclesiastical, or what not.

6. That there is no use to have power unless it is used.

7. That as the exigencies of the circumstances require, power will be used with subtle refinement, as with differential calculus or, crudely, as with a butcher cleaver.

8. That an inherent quality of power is that it knows no limit.

9. That the only limit in the use of power is an opposing force.

10. That the opposing groups rarely reach the state of equilibrium of power, for there are imponderable and variable forces coming into play all the time which, through no act of either group, throw the balance to one group or the other.

11. That during periods of near equilibrium both groups avoid open conflict and more easily effect workable compromises.

12. That with a favorable balance of power there is only one workable course of action either for employers or the workers, or for that matter any other group, and that is to take all the traffic will bear when the taking is good.

13. That the ethical moralizing with oughts, shouldn'ts and don'ts is an effort to mitigate in some manner the brutality of the conflict and is a method used mostly by those who do not possess sufficient power to enforce their own will.

14. That the possibility of conscious social control by management over the forces of industrial conflict is an assumption only, not a proven fact.

I quite well realize that this formula does not conform in any way either with the general hope, aspirations, or spirit expressed by the papers presented. It seems to me that in the desire for some idealistic state of co-operation the realities of the situation are apt to be discounted.

Perhaps it is not too much to hope that, with an open opportunity to discuss the conflicting points of view by those whose vital interests are involved, conflicts may be reduced to a minimum and workable compromises reached more readily on a basis of the recognition of mutual joint interests as opposed to outside interests in conflict with those mutual joint interests.

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[4] Director, New York Employing Printers' Association, New York.

Robert B. Wolf.[5] I am impressed with the need for clear definitions. To illustrate: We should be clear in our minds as to what we mean when we speak of a world which is abandoning competition for co-operation. Frankly, a world devoid of competition would not be very appealing to many of us, although I think we long for the day when we can substitute competition in gaining knowledge for competition in getting things. Tawney's "The Acquisitive Society" points out quite clearly where competition to get things is leading us; but is seems to me there is a vast field of competition in acquiring knowledge and gaining skill in the use of this knowledge, and the resultant wisdom that comes from skillful use of knowledge.

I believe that the one outstanding function of workers' organizations, but a function which they are often unable to exercise for lack of opportunity, is the accumulation and exchange of craft knowledge. Interest in a common mode of self-expression is the only real unifying force that has permanent drawing power. In other words, the workers' organizations should be primarily actuated by what Tawney calls "the functional motive," which is similar to that motive that brings men together into societies, such as the American Society of Mechanical Engineers, the Taylor Society, the American Bar Association, etc.

I do not mean by this that the workers' organizations should not look out for the economic welfare of their members, but I do mean that they will be much better able to do this if they can demonstrate that members of their organizations are more intelligent, skillful, and economical in the performance of their work than workers not members of craft unions. Work such as is now being done by the Printing Pressmen's Union, the Full Fashioned Hosiery Workers, and others, indicates very definitely that the ability to protect the economic interests of the workers is in proportion to the amount of service rendered by the workers' organizations.

I am inclined to agree with those who believe that management functions belong to management, and that the function of the labor unions is primarily to stimulate knowledge about working process methods so that they can assist management by suggesting improvements. Mr. Brown calls this "the critical function." Unfortunately, suggestions of this nature are too frequently looked upon as criticisms which place blame upon foremen and supervisors, who usually assume a defensive attitude which greatly nullifies the value of the suggestions.

A wise management, however, will spend much effort in an endeavor to get its supervisory group into an attitude of mind where individual and group suggestions from its working force will be welcomed.

Mr. Brown is right when he says that labor can be a great aid to industry. After all, no one knows as much about the job as the man who is doing it. He, being close to it, sees many things which can be improved. I believe that organizations where workers are constantly encouraged to exchange ideas greatly accelerate industrial progress. Perhaps one of the principal functions of labor organizations is to counsel with management as to how conditions can be created and maintained which will, at all times, encourage workers to think together in groups; for group thinking (because of the rapidity with which ideas are generated within the group) is essential to enable rapid progress to be made.

I should like to ask what is meant by "grouped employes." It seems to me that a company union, or a standard union formed along industrial lines, cannot really be considered a group. I think Miss Follett's description of a group as a number of individuals discussing or performing a particular function is to the point. Unless there is particular interest in a particular mode of expression, the group is not creative. This is the reason why the Federation of Labor idea has persisted so long— because it is made up, as I understand it, of something over one hundred craft unions. While some of them, such as the United Textile Workers, have the outward appearance of being industrial, they are in reality federations of crafts within a given industry—spinners, weavers, loom fixers, knitters, finishers, etc. Common interest in a common mode of work is probably the main cohesive force that holds these groups together. Strictly speaking, however, a national craft union is not a group. A local chapter of a craft union, dealing with a particular situation in a *particular* plant, is a group; and, as I conceive it, the real function of the national or international union is to encourage the exchange of ideas between groups in particular industrial localities, so as to accelerate progress in the particular craft or vocation. In the strict sense of the term, it seems to me, it is a mistake to say that labor organizations perform a social function. Their function is fundamentally vocational and this is their major purpose; and if management encourages their exercise of this function there will be little danger of their energies being misdirected into the field of state socialism, which, as Mr. Hoover so well pointed out, leads ultimately to bureaucracy.

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[5] President, Pulp Bleaching Corp., New York.

I agree that management engineers should spend time in gaining knowledge of the labor movement and the ways in which workers' organizations can be made to function best. As I see it, management occupies an intermediate position between capital and labor. It must develop ways and means to enable these opposing forces to work together with the common interest of exploiting raw materials, instead of exploiting each other. If the primary motive of a labor organization is vocational, and its aim to accumulate knowledge or factual wealth, and if its further aim is the creation of conditions in industrial plants to permit the maximum use of this knowledge, management can have little quarrel with labor.

Furthermore, if open methods of accounting make visible the economies effected, the results of such economies are bound to be reflected in the pay envelope, to the mutual satisfaction of both owners and workers.

I agree also that "the day is probably not far distant when organized business and organized labor and a comprehensive government will unite for the intelligent team work that alone can solve our problem." I suppose, now that Mr. Hoover is elected, it will not be considered as injecting politics into the meeting when I state that my main reason for supporting him for the presidency is that I believe he, more than anyone else, understands how to bring about such intelligent team work.

The main problem, it seems to me, as Mr. Hoover has so well pointed out, is how to develop a national and state government which will stimulate industry to work out its own problems, and, therefore, to do the thing which most advances the welfare of all workers in industry, because it is the *right* thing to do and not because it is being coerced to do so by a form of governmental bureaucracy. Those who have spent sufficient time in Europe realize the failure of the attempt upon the part of the state to coerce industry into doing things which it should do without coercion, and which industry would do if it realized that any other course is ultimately self-destructive.

I am using the word industry not in the limited sense of manufacturing alone, but as relating to all forms of co-operative human activity and including, in fact, those activities which are frequently classed as social.

It seems to me that the labor unions must begin to think qualitatively instead of laying so much stress upon mere numerical supremacy. If they do, there will be much less difficulty from jurisdiction fights, which are so objectionable to employers.

All forms of industrial unionism have the weakness of being motivated largely by the quantity—i.e., numerical—idea. It is only the craft union that tends to be motivated by quality ideals, for it alone has a common interest in the common motif in life. By craftsmanship I do not mean the old craftsmanship about which there is so much emotional discussion, for this old craftsmanship was largely mere manual dexterity. I refer to a newer craftsmanship, which requires greater knowledge because it finds expression in the intelligent use of power tools. I do not like the phrase "craft sectarianism," which is so frequently used.

I for one do not want to see labor go into politics in this country. We have been particularly free from such tendencies, although our communistic labor leaders believe in the industrial union and are constantly advocating its adoption in place of craft unions. As long as the craft principle dominates the American Federation of Labor communism will not gain a foothold.

Perhaps those advocating the company union idea should consider very carefully the possible consequences if their plan for substituting the industrial form of workers' organization displaces the craft unions. It may be the part of wisdom, as has been suggested, for management to concentrate its efforts on releasing the potential educational capacity of the craft unions, and so give them a legitimate part to perform in our industrial life.

My observations in Europe convinced me, *first,* that all over the world the most potent force combating Bolshevism is the conservative right wing of the labor movement, because it is primarily concerned with the preservation of suitable opportunities for its members to work at their chosen crafts. It is, therefore, fundamentally opposed to any subversive movement which has for its object the destruction of the existing order.

Second, that the greater industrial progress made in Germany since the war, as compared with other European nations, was due to the fact that the radicals had been driven out of control when the organized employers took the initiative in co-operating with the organized employes of the right wing, to combat their mutual enemy the revolutionaries of the left wing.

Third, that in America both the organized employers, as represented by the United States Chamber of Commerce, and the organized employes, as represented by the American Federation of Labor, were doing their utmost to keep politics out of industry, and that it would be possible to keep labor out of politics in America, and so avoid the mistakes of Europe, only if we gave it a legitimate industrial function to perform.

Finally, that the real function of the organized labor movement is educational, and that there can be no serious conflict of interests between employer and employe when both are concentrating upon the problem of increasing knowledge about the working processes and creating conditions for skillful and economical use of this knowledge.

Hollis Godfrey maintains that material wealth comes from preceding factual wealth and men and women educated in its use. Why is it not, therefore, the function of management to create conditions for rapid accumulation of factual wealth, in order to produce more material wealth for the benefit of all, and so ultimately abolish poverty? Why is it not the primary function of organized labor to educate men and women in the intelligent and skillful use of factual wealth? If these are the functions of management and labor respectively, it seems to me that it is the function of capital to use its influence with management to create conditions which will stimulate management and labor in the exercise of these functions.

I am using the word "capital" as referring to those individuals who exercise the function of administering material wealth (potential and actual) which has resulted from the industry of human beings.

At present both capital and labor are unthinkingly placing obstacles in the way of efficient management, and the only way to remove these obstacles is for management to devise ways and means to accelerate the process of accumulating facts and to develop a technique for their evaluation and presentation. If this is done, we can develop an ever widening area of common interest and reduce correspondingly the area of conflict between the two.

IT MUST be assumed in the present stage of industrial evolution that generally the normal organization of industry is one in which a capital-entrepreneur executive group must assume responsibility for effective leadership in enterprise, and the worker group responsibility for effective followship. Yet when considered in every detail the matter is not so simple as this. Any individual or group may under favorable conditions become an original and independent source of power and of effective if not nominal leadership. To the extent that scientific management substitutes the authority of the law of a managerial situation for arbitrary authority of an individual and establishes functional responsibility and authority throughout an organization, it creates a situation in which many sources and varieties of leadership will develop. This has to an increasing extent come to be recognized in the procedures and in the doctrine of scientific management. (Taylor Society Book, *Scientific Management in American Industry,* to be published this Spring by Harper & Brothers.)

Marketing Problems of 1929[1]

II. The Marketing Problems of a Manufacturer of Equipment[2]

By RALPH H. DICK

President, Barrington Associates, New York

I THINK we all concede that the principles fostered by Mr. Taylor and others who followed in his steps have brought production methods to a high state of efficiency. Twenty years ago production emerged from the dark ages, and the time now has come for marketing to have its renaissance. We have been too slow in applying scientific principles to sales work.

It is sometimes interesting to reflect on the reasons why we have been so slow in adopting better marketing methods. Of course, we all have our own ideas on the subject, but three things always stand out when I allow my mind to dwell on this question.

In the first place, probably at no time in the life of any of those present has there been such a need for better marketing methods generally. We are experiencing a unique era in the history of this nation. The emphasis has passed, for the time at least, from production to sales. Until now the strong urge to dress up marketing methods has not existed.

In the second place, business executives have been too prone to leave marketing, and particularly the policy matters surrounding it, in the hands of pure sales executives. Until recently, and it is still true in many instances, the chief executives have come up from the production end of the business. They have been reluctant to tamper with affairs in the sales area of the business field, and the result has been that the sales manager has often been left too much to his own devices. The general manager, the chief owner, the partner, or the chief executive, with his wide understanding of the financial and production sides of the business, has not contributed to the sales side what sales require from him. By the same token, the sales manager, because of his limited experience, has been unable to contribute, constructively, to departments other than his own.

In the third place, I think that most people have considered, and still consider, that sales work deals with such imponderables that many of the scientific methods used in other forms of business activity cannot be successfully applied to it. In these three reasons I think you have at least part of the answer as to why we have been so tardy in adopting better methods of marketing.

I should like to enlarge briefly upon point number two before proceeding further. As I said before, I think the fact that the chief executive has not taken enough interest, or a sufficiently intelligent interest, in sales work has been responsible for much of our trouble in marketing. In that connection I should like to again mention Mr. Freeland's point, namely, that we are not doing enough profitable selling. There has been too much urge for sales volume and not enough urge for the profits that should go with it. One of the causes for that is the basis of compensation upon which sales managers are frequently employed. The sales manager is given a salary—sometimes a large salary—and he is often given a bonus in addition. If he is given a bonus, it is usually based in some way on sales volume, either sales increase over past performance or some other plan which stresses sales volume solely. You must always remember that human beings have a certain amount of selfishness in their make-up, and you must therefore enlist their aid in some *direct* manner if you are going to appeal to them to help you control the profits that should flow from sales. If you place the emphasis on sales volume by the kind of compensation deal that you make with the sales manager, you will probably never be able entirely to get away from the evils which can well follow. The sales manager may sit in conference with you by the hour and listen to your talk about profits; you may even be able to enlist a certain amount of co-operation from him; but he is not going to fully understand your profit objective unless he is directly and personally concerned.

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[1] Papers presented before a meeting of the Taylor Society, New York, December 6, 1928.

[2] Mr. Freeland's paper on "Marketing Problems of a Manufacturer of Resale Goods," presented at the same meeting, appeared in the December 1928 issue of the *Bulletin* (Vol. XIII, No. 6, p. 223).

I have seen the following plan used with some success. It consists of giving the sales manager a reasonable salary, and a bonus that is broken into two parts. One-half of the bonus is based upon sales increase, for it is not fair, of course, to ask the sales manager to accept bonus compensation based entirely on profits, inasmuch as too many elements over which he has no control determine the amount of profits. Therefore, no sales manager's bonus is a proper one unless it has some direct tie-up with sales increase.

The other half of the bonus may be provided by issuing a certain amount of fictitious stock to the sales manager. I say "fictitious" because the stock does not actually pass into his hands. He should have this stock in his name during the period of his employment with the company, and the dividends paid should be at the same rate as those paid on the standard stock. By this method emphasis is placed on profits in a way that the man can never forget. If he wants an extra income of $2500 a year, he knows that one sure way to get it is to help in expanding the profit side of the company's business. I mention this in passing merely because I feel that it has a very direct bearing on the whole proposition of unprofitable selling. We have been making deals with the directing heads of our sales work which did not contemplate at the time we made them, or at any other time, what we primarily wished to achieve, namely, profitable selling.

The topic assigned to me was "The Marketing Problems of a Manufacturer of Equipment." Mr. Freeland has very ably covered many of the principal elements that enter into the problems of any manufacturer, such as compensation, quotas, mergers, and other problems common to all types of manufacturers. In my opinion there are, however, three fundamental differences between the type of manufacturer that Mr. Freeland has been discussing and the manufacturer of equipment or of other items sold direct to industry.

First, the buyer of equipment is usually an able, technically-minded, exacting type, ordinarily not found in the retail trade. He may be the president of the concern, the works manager, the superintendent, the chief engineer, or a combination of them all. Such an individual demands much logic and very little "conversation" in the sales presentation. Second, the fact that equipment is used as an aid to further production means that particular emphasis is placed on its money-making and economy features. This must be borne in mind very strongly by anyone selling equipment to industry. Third, there is the danger—and it is a very real one—that the buyer, if he is a large buyer, will think that he can make the equipment himself, or that he can use a partially "home made" substitute for it. This is frequently a very serious matter.

If these are the three problems, what are we going to do about them? The fact that I have been asked to speak to you this morning on this subject does not give me any special privilege to reel off answers to these problems. Certainly I cannot do this, and I cannot imagine that I was expected to do it. I can only give you the benefit of my own experience which, after all, is simply one individual's personal experience plus observation and study.

It is my opinion that we have in these three problems really only one problem. These three factors conspire to make of a sale to industry a highly specialized business transaction, and if we equip ourselves to meet this condition we shall have solved the problem.

I cannot think that any seller of equipment will be able to compete successfully with others in the same field if he does not surround his product with some honest, demonstrable "scenery." To put the matter in another way, a machine tool, a piece of conveying equipment, or an electric welder is not like a package of chewing gum or a fur coat. A package of chewing gum or a fur coat has a very definite and obvious function—or it is presumed to have. A piece of equipment sold by a manufacturer has a very definite function also, but it is not always so fully and readily demonstrable. If the real and potential function of that equipment is not constantly borne in mind by the maker or seller, he is likely to sell it as a "package of chewing gum" and thus be subjected to every element of price competition that naturally creeps into such a sale. This type of product is not a bare product. It is a combination of product plus engineering service, and I have never seen a successful maker of equipment who did not take complete cognizance of this fact. He regards his product as a *combination*, a hyphenated thing combining both product and service. The maker of, let us say, a machine tool, has a laboratory, the functions of which are to improve his product, to look ahead and see the uses to which it may be put and to synchronize the product to these uses. If the laboratory is truly doing its work well it will thus provide the salesmen with something that they can properly enthuse about, and with the requisite "scenery."

And this leads us at once to the second part of a possible answer to this problem. The maker of equipment must bear in mind constantly that he is sending out *negotiators* to effect *business deals*, and he must expect that a mere salesman, when he comes in contact with the superintendent or chief engineer in the buyer's plant, will be "tied into knots" on technical matters in fifteen minutes or less. He should therefore send out only those men who can talk the language of the people they meet, when technical matters are to be discussed. Now there may be a few cases of successful engineers and highly capable salesmen merged into one person. They are very rare, however; as a class they do not exist. The manufacturer of equipment frequently makes the mistake of thinking that the combination *does* exist. He realizes the problem, but he tries to straddle it; he tries to get a man who can talk a smattering of engineering to the buyer and who is at the same time a good enough salesman to get an order. He is asking too much. A division of tasks is necessary if he is to properly capitalize on the possibilities that his laboratory holds for the trade, and if he is to effect promptly the sales that he wishes to make.

The first man to approach the customer should be a propaganda or missionary man. If this man does nothing but establish confidence in his company and in the services of its laboratory and engineering staff, he has done a big piece of work. The value of his work will be dissipated rapidly, however, if he attempts, after he has established initial interest, to discuss mechanical problems, with which he is only partly familiar, with technical people. On the other hand, he should endeavor to build up so much respect for his company's laboratory that, when the second man calls (who is 75 or 80 per cent engineer and 20 per cent salesman, or even 100 per cent engineer with a good personality) the element that gives the equipment maker more than a "fighting chance" to come through with a better price than the competitor's is put into the sale.

I am not talking theory; I have seen this plan work, many times. I have known companies that were able to get as high as 33⅓ per cent more money for what *appeared* to be the same product. Of course it was not the same product. The manufacturer who received the 33⅓ per cent increase in price had a product that was a bit better in labor and material, in general workmanship and in "put-together"; but the principal reason for the extra price was the confidence the customer had in the service he was to receive from the manufacturer of that piece of equipment.

If the manufacturer who contemplates buying a piece of equipment, because he sees the needs changing in his plant, has to go to the manufacturers of equipment, or ask them to come to him, and force his needs upon them, he is not going to pay a nickel more than he *has* to pay when the time comes to effect a purchase. On the other hand, if the manufacturer of equipment has a laboratory, if he thinks and builds ahead sufficiently to take to industry that equipment which is just a little ahead of the times, just a jump ahead of what the trade is actually asking for, he has some "scenery" that he can properly ask real money for.

A manufacturer of conveying equipment with whom I am acquainted thought he had an answer to the problem I have just stated. He conceived that is was absolutely necessary, if he wanted to keep out of the muck of competition, that he have a real engineering service for which he could charge. As a result he hoped to get a 20 per cent better price than his competitors. His fundamental idea was all right, but he fell down in the execution of it; his service was not good enough. He found it very difficult to get the 20 per cent advance, and at times had to accept even 5 per cent less than his competitors. The trouble was that his missionary men sold something that his engineering department was not trained to deliver. In that case it was the service and not the selling that needed renovation.

It would be profitless to attempt to discuss individual applications. Each company differs from every other one. Answers that are sound for one are not sound for another, and answers that are sound today may not be sound tomorrow. I have only attempted to indicate what I regard as the principal problems of the manufacturer of equipment, as contrasted with those of other manufacturers, and the *fundamental* answers to these problems.

Method is the important thing, and I know of no better method of tackling any sales problem, in any line of work, than that of research. I recently noticed an editorial on research in a comic weekly. It was almost brutal in the manner in which it poked fun at the subject. This is an attitude that is most irritating to those of us who are deeply interested in the topic, but we must have to admit, if we are honest, that our stabs at research have not always been impressive. We have done more talking about research than real research work. It is an old method, to which the human race owes much of its progress, but we still look upon it as an abstract and mysterious thing that is good only for academic men and large corporations; in fact, good for almost anyone but ourselves. It has been used haphazardly in almost every successful business enterprise that exists today, but its consistent use by design and intent is still only too rare.

I think the reason why we have done so much talking about sales research and so little really planned work is that we have not recognized research as a separate force in business. When used it has been linked with other activities, such as advertising and product development. It is a separate force, however, just as advertising and cost accounting are separate forces, and until this is recognized the full value will never be derived from its use. The average concern usually employs research to meet some emergency, whereas it should be used to *avoid* emergencies. To use research in this manner is about as sensible as it would be to engage in a big national advertising campaign to get one order.

In an effort to bring out the point that research is a separate force we have prepared an illustration that purports to be a sort of allegorical picture of business as a whole. (Figure 1)

I wish every one of you would regard the "army" as your own busines army, whether you are in the manufacturing business, banking, insurance, public utility or what-not. The objective of your business army should be the cultivation of "Known Markets For Present Products," the cultivation of "New Markets For Present Products" and the cultivation of possible "Markets For New Products." Between your army and your objectives, however, stand mountains of "Sales Resistance" that must be scaled or pierced before the objectives can be reached. In the distance you have the attack of "Competition" bearing down on the same objectives, and it is your job to reach them first, or at least to get a good share of the three markets indicated on the right. In the distance is a mountain of "Untapped Resources of Product and Methods" with which to serve the markets more effectively. Your competitor, of course, has the same opportunity to dig into this mountain that you have, and to assay its riches.

The observation blimps are the eyes of your business army. Without them your officers are handicapped by a limited perspective. With them you are able to get the right perspective, and to see the valleys and passes through the mountains of "Sales Resistance." You are able to see what the "promised land" of markets really looks like, to survey calmly and dispassionately the activities of competition and to interpret the significance of its moves. You are further able to discern new and untried methods and products. With this set-up you have a militant business—organized, aggressive and far-sighted. To be ideal, a business should have sound sales policies and organization, backed by a product of sound economic worth, underlaid with sound general management, and guided by intelligent research.

If you further analyze these elements you will see that sound general management consists of sound financial policies, including accounting, credit, and collections; sound legal practices; good purchasing, transportation and insurance policies; knowledge of business conditions and trends; proper treatment of employes; right attitude toward owners and public, and toward progress in general; proper control by systems and statistics; and proper understanding of and co-operation with sales aims and activities. That is sound general management.

The product of sound economic worth should have true economic utility. You may be able to put another type of product across by high pressure sales methods, but you will not be able to

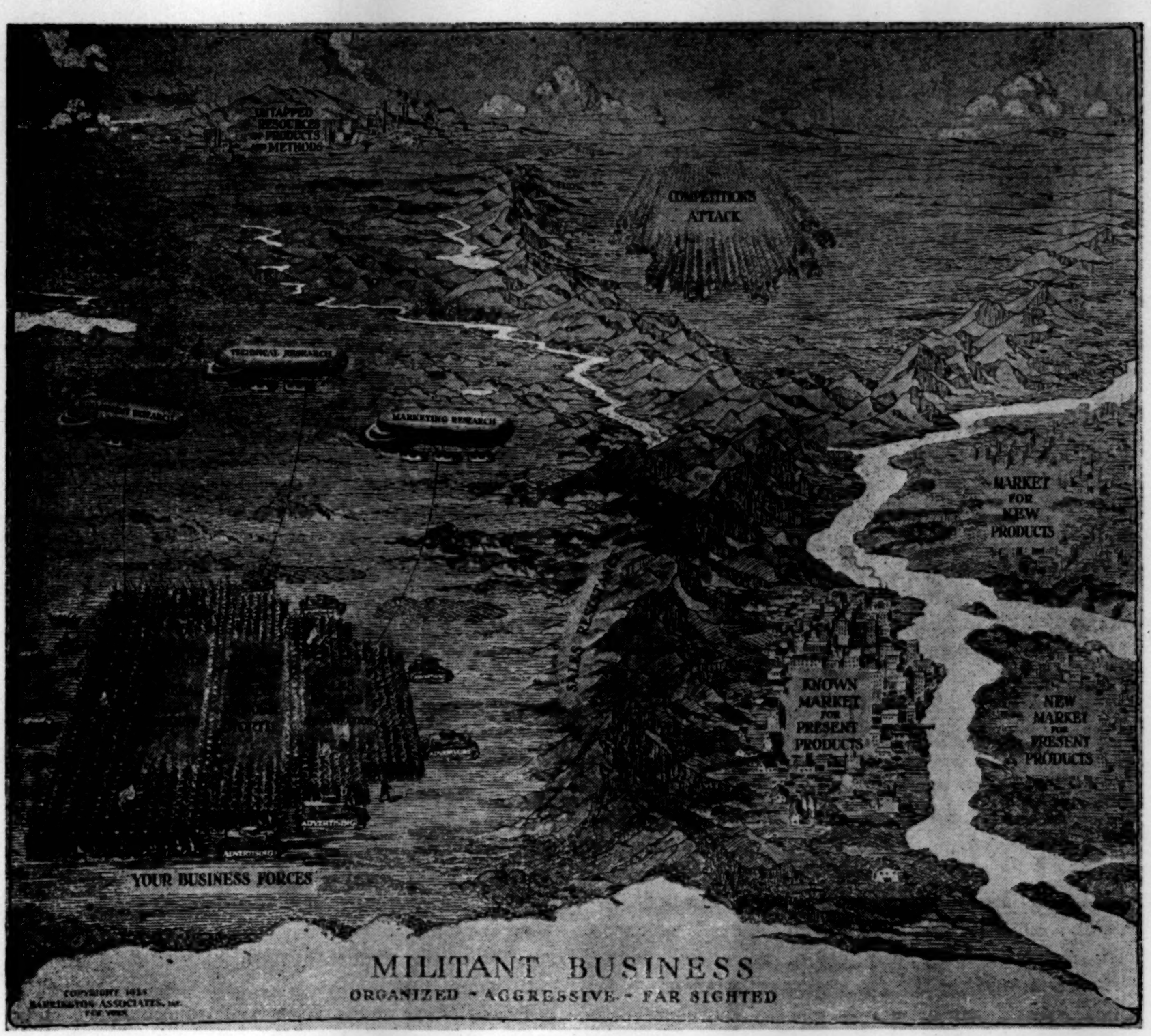
UNTAPPED RESOURCES NEW PRODUCTS AND METHODS
COMPETITIONS ATTACK
TECHNICAL RESEARCH
MARKETING RESEARCH
MARKET FOR NEW PRODUCTS
KNOWN MARKET FOR PRESENT PRODUCTS
NEW MARKET FOR PRESENT PRODUCTS
ADVERTISING
ADVERTISING
YOUR BUSINESS FORCES
MILITANT BUSINESS
ORGANIZED - AGGRESSIVE - FAR SIGHTED
BARRINGTON ASSOCIATES, INC.

Figure 1

build a business for 1940 with it. The product should also be efficiently and economically produced, and at the proper geographic points. An effective engineering department should help toward this end. It should be correct in styles and sizes, and in the price set upon it. Incoming materials should be carefully inspected, also goods in process and finished goods. The finished product should be delivered to the user in good condition and at the proper time. The product should have distinctive qualities that are easily demonstrable. These are, of course, ideals against which your products may not check completely. It should be interesting to any manufacturer, however, to check his own products against this list of elements to note how close to par the product really comes.

Sound sales policies and organization are made up of proper knowledge of markets; proper sales promotion plans; proper sales strategy and campaigns, with the ways and means of making them effective; proper publicity, both in advertising and propaganda work; proper sales outlets; proper operating costs, controlled by budget; proper control by systems and statistics; proper handling of personnel, including selection, allotment of tasks, compensation, training, inspiration and supervision; and proper understanding of and co-operation with the aims and activities of general management. The general management and the sales organization must understand each other, and each other's objectives, equally well.

The blimps in the illustration indicate the make-up of "research." One of them is searching for better financial policies and for better general management systems and methods of control. Another is searching for technical improvements to develop present products and production methods, and to work out new products and production methods. A third is studying trends in marketing; it is estimating the possible reception of new products in the third market; the possible saturation point and the stability of demand in any of the three markets; and it is analyzing the various moves that competitors are making.

Both technical and marketing research combine in the search for new products. The salesman in the field may come across the need for a new product. His report is analyzed and turned over to the technical staff, which in turn endeavors to make a practical thing of it. In the picture I have separated the functions of technical, market, and management research by showing three blimps, because their objectives are so different. Co-operation between them must, however, be very close.

I am calling this type of research "applied" research to distinguish it from "pure" research (whether economic, technical or scientific) whose benefits should be for the community as a whole. Pure research might well have been represented in the illustration by two unattached blimps, having the same relation to each of the armies. The applied research departments (management, technical and marketing) should constantly be on the lookout for pure research findings that have a bearing on the problems of the industry they are serving. It is sometimes hard to draw the line between pure and applied research, since many technical laboratories attached to particular companies often do a good bit of pure research work, and all terms which I am using in this connection are admittedly rough and relative.

And "advertising" of course plays its part in the complete set-up. I have represented it in the illustration as the artillery, or tanks. The purpose of this artillery is to shell the market, in advance of the attack, with propaganda, information and education, so that the desire to be conquered by your army, rather than that of the competitor, is engendered in the markets. The second function of advertising is to hearten and encourage the sales army, by paving the way for it. The third function of this artillery is to ward off the competitor's attack. And the competitor's army has its artillery, and can have its three blimps, just as you can have yours. Therefore, it behooves you to get yours in position and into operation first.

I was asked to suggest some fundamental approaches to the problems of the manufacturer of equipment. I believe that the fundamental approach to these and most other business problems lies in adopting the right *method* rather than questionable "specifics." Broad acceptance and full use of the research method will automatically provide proper and effective specific remedies. Without research, specifics are only too often mere illusions.

Discussion

Fred W. Shibley.[3] The first subject discussed here today, "The Marketing Problems of a Manufacturer of Resale Goods," is one of the most interesting problems in merchandising in this country today. It is one of the most difficult problems that manufacturers have to solve, and it has been solved in hardly any particular as yet. It is the problem that is pre-eminently confronting the textile industry. The manufacturer in this industry is unable to follow his goods through to the ultimate consumer. A middleman who purchases goods in the form of piece goods from him, remanufactures his goods into finished goods and sells them to the manufacturer of garments. The textile manufacturer never comes in contact with the ultimate consumer of his product. Therefore, he cannot, in the manufacture of his goods, think in terms of the ultimate consumer.

The success we are having in this country today is due to the fact that the manufacturer can get in touch with the ultimate consumer of his product, that he thinks in terms of the ultimate consumer and co-ordinates his mind and thought with the mind and thought of the consumer. True merchandising is the co-ordination of the minds of buyers and sellers, and we shall never have merchandising on a profitable and economic basis in this country until this is accomplished. In the industries in which it has been accomplished we in the banks are witnessing the making of tremendous profits. The manufacturer who is out of touch with consumer thought is at a disadvantage. He is manufacturing on an uneconomic basis because, if I understand economics at all, an economic basis in business means a steady flow of material from production through to consumption. Anything that is uneconomic will eventually destroy the business that is engaging in it. A cutter-up of merchandise who thinks that he can permanently buy from a manufacturer at a price lower than cost will ultimately destroy his own business, if he continues in this practice.

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[3] President, Bankers Trust Company, New York.

An industry, manufacturers of resale goods, that is exceedingly prosperous all along the line in this country is able to follow its products through to the ultimate consumer. It knows what is being done with its products, how they are being styled, what the processes of manufacture are and how the products can be made so as to please, approximately, the ultimate consumer. This is the automobile industry. The automobile industry is not going to the steel companies and saying, "You must sell me so many sheets of steel at such a price. I will pay you that much and no more. Take it or leave it." That is not good ethics in the industry. Throughout that whole industry the golden rule is working today, and success is the consequence.

The introductory thought that I want you to have in mind is that co-operation must come into business, more than ever in the past, in order that success may obtain. The individual cannot go it alone and succeed. He must work with the other man. Everyone of us must think that the other man's success is his success. We must try to help each other. The buyer of woolen goods and the cutter-up of woolen goods must think in terms of the manufacturer. He must try to get his style ideas back into the minds of the manufacturers and they must think ahead into his field.

I am much interested also in the human aspects of these problems. Recently I attended a meeting of the board of directors of a phonograph company. We were discussing the sale of records throughout the world, and I asked the sales manager who in the United States had sold the greatest number of records for this company during the last year. We had been listening to quite a long talk about the difficulties of distributing this product. The man who held this record was a man who lived in Chicago and had a shop on Wabash Avenue, I believe. The store has a nine foot frontage and is open at both ends. It is twenty feet long from front to back. This man is always in his store He plays a record into the street and studies its effect upon the people that pass. When he finds a record that people stop to listen to, or come across the street to hear, he plays it over and over again. He continues to play it just as a silk manufacturer continues to work a style, until it is overdone. He then tries a new record. And the people continue to come into that store and he is always there to see that the potential buyer gets what he wants. Out of this little story emerges a human being—and the most important element in merchandising distribution is the human being.

I asked also for the story of the man who was the second largest distributor of this product. It turned out to be a man who lived in a town in West Virginia with thirty-five hundred inhabitants. He sold into the millions of records each year in this little town. He too was a human being. How did he do it? He hired a number of Ford cars and his daughters and some young men that he hired went about the country selling records to people. He was not an educated man and he was not trained in scientific management, but he knew how to make each one of those Ford cars pay a fair return on the invested capital.

In contrast to these two men is the story of the man who wrote and asked me to go over his balance sheet and tell him why he was not making money. This was a human question and so I told him to send along the balance sheet. I found it a first class statement, broken down and analyzed so that I could get a good picture of the man's business. The thing that stood out immediately was that he was paying too much money to sell his product. There were three brothers in the business and each drawing a good salary. I wrote to the man and told him that there were too many men in his organization who were sitting around making figures instead of working. I told him that if he wanted to make money he should send these men out to sell his product. There is more of this sort of thing in big business than in small.

Management, on which the Taylor Society places its emphasis, is at the center of all these problems. The men in your Society have done as much as any other group of men in the country to lead men toward co-operative thinking. And it is this co-operative thinking that is the basis of our prosperity. It is the highest phase of civilization. When all men think co-operatively we shall have an ideal civilization; they will be thinking in terms of common humanity. When you examine businesses that are out of joint in this country, you will find that they are out of touch with their communities and with general conditions. There is no co-operative thinking in their organizations.

Norman E. Horn.[4] When I first received the abstract of Mr. Freeland's talk I thought a book would be required to discuss it properly. And now that I have heard his excellent presentation and Mr. Dick's, I am inclined to believe it would take a library.

One of the things that occurred to me as I heard both of their talks was that in applying these principles, you have to have in mind the patient. A doctor would not prescribe in the same manner for an anemic child and for an apoplectic man. The same is true in industry.

In the industry with which I am connected we are organizing one of the institutes of which Mr. Freeland spoke. It is serving as a clearing house for ideas and methods and is proving of particular benefit to the small concerns who are not able to afford individual research departments.

Mr. Freeland also mentioned mergers. It is my belief that these frequently come about as a result of financial or geographic conditions and are not necessarily a proper part of a sales discussion.

As to national and sectional distribution, I think some manufacturers have been misled in the past. The inevitable goal has always been national distribution, but marketing counselors and experienced sales executives are curing us of this idea of the necessity for dominance. Many New England companies would have been more successful had they confined their sales efforts to the territories east of the Mississippi.

The question of whether or not it is profitable to go after greater sales volume has to be determined by individual plant capacity and existing overhead. It is not an easy or pleasant job to reduce organizations, though it is often necessary, as in the textile industry, for the general good. Either expansion or reduction has to be planned in relation to the needs of a particular business at a particular time.

From my point of view one of the most important things that Mr. Freeland spoke about was the sales forecast and its relation to factory problems. The Federal Reserve Banks, the Department of Commerce, Babson's, the Harvard Economic Service, and others are making all sorts of general information available. It is the business of each individual company to interpret these general facts in the light of its own current needs. The business in which I am engaged happens to be highly seasonal. Large sums of money are at times tied up in inventories and the results are partly a gamble. This is desirable and even imperative if a fairly even production rate is to be maintained, but a whole season's profits may depend on this gamble. If the whole organization is geared to make use of information and research service the gambling element is reduced. I think both Mr. Freeland and Mr. Dick will agree to the importance of having operating organizations so lined up that they are able, and *willing,* to take advantage of such information and research services as are available. There is no point in having them if they are not to be used.

I have not always been a sales manager. Before I was a sales manager I was a member of the Taylor Society! That is perhaps the reason for my point of view. I think it is even more important in sales than in factory work to use plans and schedules. Mr. Freeland spoke of written instructions. They, combined with a tickler system, may serve the purpose; or we may wish personally to establish and supervise a planning board. We must not call it "scientific," however, and thus frighten our organizations. Give them to understand that we are merely working out a practical method for keeping everything in mind.

We should have a written plan for each project that we undertake and set up a schedule for it. It is then possible to work back from that schedule and to say to the factory organization, for example, "On such and such a date we want samples for our sales convention." A final date must be set for each assignment and a follow up or control system worked out. The minute we begin to talk about this system as scientific, however, we are going to hamper its progress.

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[4] Sales Manager, McCallum Hosiery Company, Northampton, Mass.

I have had several years of experience in working with Mr. Freeland on sales quotas. You set up one kind of a quota when you are new to a business and another after you have learned something about it. The first is theoretical, based on census figures of wealth and population, statistical material on car ownership, analyses such as those furnished by the Curtis Publishing Company and Butterick, etc. After you have gone further into the work you will find your theoretical quota upset by various factors, and it is necessary to find the reasons for these upsets.

The Chairman of this meeting made a point which I should like to emphasize in closing. So many sick industries think that they can only be cured by some drastic, ultra-scientific plan or device, whereas what they really need is vigorous leadership. A good many New England problems, for example, would not be sales problems at all if the general management problems could be worked out. I am not belittling research and scientific methods, but I am trying to point out that the best plans, if never made effective, are no substitute for energy, vigor and hard work.

Carl Reimers.[6] I want to say one thing about the institutes that Mr. Freeland has referred to. A good many of them have been formed lately in the textile and other industries which are supplying, to a large extent, raw material. I think they are running into one dangerous situation. They are considering their function to be one of promotion rather than research. I do not believe that the Cotton Textile Institute, for example, can conduct a co-operative or promotional campaign that will do the cotton mills, the cotton converters and the apparel industry any particular good, because they are selling a basic product, and the public does not recognize the finished product in terms of the basic product. The Cotton Textile Institute, the Wool Institute, the Silk Association, all these institutes, right now are considering spending a lot of money on such work.

The three functions of research that are pointed out in the illustration are splendid when we have grown up to them. In so many businesses today, however, we need a small amount of research where we have none.

Mr. Shibley mentioned the textile industry particularly today. The experiences that we have had recently are, I believe, interesting. A great many of the textile concerns making staple goods, who control their selling, have found it very difficult to maintain a market price that will give them a profit on that staple goods. A plan was recently worked out which might prove of use in other fields. A particular line of staple textiles was footballed around the country, among the retailers and wholesalers, simply as a leader, to draw in customers, and get other business at a profit. The market price on that particular textile was pretty close, because it was a staple and competition made it close. There was no way that the manufacturers could get the wholesale trade or the retailers to maintain the price necessary for a normal profit. Two or three of the textile houses have entered into what is known as the agency plan, whereby they put the merchandise in the jobbers' hands, on consignment, and kept title to it until it was sold. The jobber had to sell it at the full wholesale price in order to get his commission. In that way, the manufacturers controlled the price until the goods got to the retailer, at least.

The new plan that I wish to mention is a plan by which the wholesaler, the retailer and the manufacturer are all offered a bonus for maintaining prices and for complying with certain restrictions and specifications that form a part of the sales agreement at the time the jobber, the retailer or the manufacturer is appointed. If at the end of each six months' period, these channels of distribution are able to lay before the manufacturers, or the mill, bona fide data to prove that they have lived up to their agreement, then they get an extra discount on their merchandise which is an extra profit over and above what had been received before. This plan has been in existence now for the past year and is working extremely well.

A good many makers of basic cloths, even though they carry them through to style merchandise, have established a further control on their market by licensing manufacturers of apparel and household articles to use their trademark on the article and carry it through to the consumer. In some cases they permit a double trademark, one for the fabric and one for the article, thereby putting a double guarantee on the finished article. The manufacturer of the textile can then advertise his fabric effectively in both piece goods and in final apparel.

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[6] President, Reimers & Whitehill, Inc., New York.

I want to mention also some practical forms of style research. These are all tied up with model stocks, price levels and the life of a particular style. In a manufacturing organization where they are making many continually changing styles a graphic chart on each style, from the time it is put into the hands of the sales department, will indicate definitely when to withdraw that style from the sales department, when to say that there is so much of it left and that the sales department has so many days in which to move it. In simplifying a line of style merchandise, our recent experience has shown that by taking the line as it stands and trying to fit it into the largest model stock that we would sell to any one type of outlet, we could get rid of a lot of numbers that were obsolete because they were no longer justified from the style or utility standpoint. The model stock must take into consideration one of the factors Mr. Freeland mentioned, and that is the price level. We found in a great mass of figures from a large number of stores all over the country that about 85 per cent of the merchandise sold falls into three price levels. Now these three price levels are not the same in all stores but they can be described as the lowest free selling price, the most popular selling price, and the high free selling price. If averages are taken for the country, these price levels can be arrived at and a model stock built up which will make possible a simplified line of merchandise, without in-between prices, that will move quickly and yield the largest return.

H. R. Tosdal.[6] Recently I have been interested in the application to sales problems of one of the economic principles that we learned years ago. That is the law of diminishing returns. Professor Freeland talked about sales volume. The law of diminishing, or increasing, returns applies to this phase of business as to others. Professor Freeland might have said that in going after sales volume in order to get low unit costs we may reach a point where we are no longer making a profit on our product. I think he would also agree that it may be wise to go beyond the low point in sales costs for one line in order to increase the productiveness of other departments to which the law of increasing returns at the time applies.

Henry S. Dennison.[7] Most of the points that Mr. Freeland has raised are recognized as valid, though they are as yet in the elementary stage as far as application is concerned.

I should like to re-emphasize one point that he made. It seems the most theoretical, the farthest in the future, and is therefore the easiest to overlook. That is the question of sales costing. I thoroughly agree with Professor Freeland that there was an advantage of production costing that went along with the development in scientific production management. Without some form of production costing it would have been difficult to make any progress at all.

And the same is true of sales costing. In my own thinking, to help distinguish between present methods and those that will, I hope, develop in the future, I call the present practice sales expense accounting. We account for what is spent, express it in percentages of total expense, etc.; but sales costing must be on the same basis as factory costing, as contrasted with factory expense accounting. It must tie up with causes. This may mean a multitude of divisions which will show the various causes of expense and bring each item into relationship with the whole. I realize that this is an extremely difficult job. We may have to develop a sort of calculus for it because it is distinctly marginal cost accounting. It has to do with marginal costs, which are not fixed entities. They change as the conditions that make them into a margin change, and you must express them as relative values rather than as absolutes, always. If we sell so much more at such and such an effort, then the cost will be changed if the effort is changed, and so on. They are not expressible in the simple terms in which most of our factory costs can be expressed. We have marginal costs in the factory, but we pass over them because they are not often important. In selling, however, the art of marginal cost finding is of primary importance and cannot be passed over. It will require hard work, but it is immensely worth doing.

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[6] Professor of Marketing, Harvard Graduate School of Business Administration, Cambridge, Mass.

[7] President, Dennison Manufacturing Company, Framingham, Mass.

Engineering in Management[1]

Variations in the Application of Engineering Technique to Management as Illustrated by Variable, Intermittent and Continuous Processing

By G. E. SCHULZ
Lancaster, Pennsylvania

THE vigorous application of engineering to industry in the United States has disrupted former standards of industrial organization, and gives every sign of continuing at a more astonishing rate. Because of this it seems desirable that the engineer review the changes he has wrought in order better to comprehend the significance of his technique and better to control its influence in the future. This paper is concerned with the application of engineering principles rather than with the principles themselves, and with the position and effects of engineering in the economic structure of business.

Mechanization of Industry

The increasing emphasis that has been placed on marketing since the war has tended to obscure the significance of mechanical and process improvements and their lessons for the future, especially with respect to the possibility of still greater mechanical improvement. There seems to be general assumption that now the limit of mechanization, with its attendant influence and problems, has been reached.

Fears have been expressed that mechanization is proceeding too fast; it has been suggested that it might be better to go more slowly and eliminate the attending administrative and social problems before striving to attain a new plane of mechanization. The age-old fear of the machine is still with us, but it appears that now the administrative groups are more afraid of it than the workers. In the mechanistic advance, social adjustment is only one of the problems. The question of competitive adjustment is ever present. Will it all pay and will we get from it what we should? These are some of the questions with which administration is confronted.

When we observe the remarkable feats of mechanization, both in the factories and offices of some of our larger businesses, it appears superficially that the job has been pretty well accomplished, and that for the moment not much remains to be done. As we observe various building materials, books, and products that we handle daily, we are also confronted with the fact that a tremendous engineering provision is back of them.

This, however, is only one side of the picture. If we were to start a survey of the industries along the rivers and through the manufacturing districts of this and connecting cities, we should find many examples, perhaps a majority, of equipment and processes far behind what engineering science has demonstrated and the market affords. Many plants are not modernly mechanized. These conditions are readily apparent in both small and large industrial cities. Some believe that many of these establishments are doomed to go out of business. Is it surprising that the banker is concerned about them? Can both these types—organizations based on good engineering methods and those based on obsolete engineering methods—be sound?

Management Opposition

What has engineering done to warrant management's fears and opposition? It has changed, and is changing, the whole status of the operating organization. It has created new processes, both mental and physical. It has regularized and incorporated into the machines much of what was once human manipulation management. Will this new development go so far that factory operation will become simply a question of steering an industrial vehicle that engineering science has created?

The new philosophy of engineering and its influences have not been, and are not, sufficiently understood. It seems that the engineer has been slow, or too busy, to understand the consequences surrounding and beyond the immediate facts of his work. Because of this, he has been slow to present and establish the moral influence of engineering as a feature of the newer business construction.

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[1] Paper presented before a meeting of the Taylor Society, New York, December 5, 1928.

Let us consider some of the more specific reasons why the science of engineering has not been applied more rapidly. This should aid us in ascertaining the reasons underlying the conditions of mechanized industry all along the line from variable to continuous processing, and should indicate also the management problems involved. We as engineers are concerned with the possibilities of improvement, for we must live by future accomplishments, not past glories. The social-economic aspects especially demand attention, because engineering is interwoven with our ways of life.

Managers should readily accept the idea that changes so extensive as those brought about by research and engineering make desirable, in addition to the direct improvements, a whole chain of related improvements. They should expect to obtain indirect as well as direct values of engineering. They should be willing to accept the fact that if engineering changes operation it also changes organization. They should prepare the facilities for such changes. Operating and social changes, as well as the physical products of engineering, should be prepared for and integrated.

However, management accepts the immediate direct results of engineeering without perceiving, accepting and preparing for the resultant conflict with established habits. Instead of the way being opened for a complete utilization of engineering, operating and social conflicts are set up, and the full results of engineering are not realized. The difficulties are chiefly problems of administrative leadership.

Managers have been accustomed to watch most intently at the fabricating ends of the factory, for here are represented processes and methods, things which are easily observable. However, in the past processes and methods were almost entirely created and the results realized in the factory, whereas today they are in large part created and realized outside the factory. Often their training and experience will not permit managers carefully to look behind the scenes and observe the full organizational, economic, and sociological significance of engineering.

Engineering has of necessity been accepted as a technical influence, but not sufficiently as a controlling force within organization. Engineers have very materially aided in the building of our scientific age and in forming our social structure; but there is still a lack of primary recognition of this fact.

The responsibility for greater recognition and progress rests to a considerable extent with the engineer himself. He has not properly formulated the phenomena of his work into principles of plant and social organization. He has been wrapped up in the technical, justifiably in this new art, to the exclusion of administrative and economic purposes. Because of this he has been accused at times of being interested in engineering for engineering's sake. The engineer has upon occasion wanted his department segregated and has been willing that his product should be accepted purely as an objective device. We should not confuse the influence of a science and the practice of individuals, however.

The engineer, because he has been engrossed in the technique of his profession, has not taken time for the wider aspects of his work. He must see himself and the results of engineering as a part of the organization function before engineering will receive the recognition due it and make the progress that it should make.

It is true that many of the organizers of the country have come from the engineering profession and the mechanical trades. These are individuals who, as leaders in enterprise rather than technicians, have seen the importance of the philosophy as well as the technique of engineering, and have made universal application of the economic purposes of engineering, whereas pure technicians often made only spotted improvements. Therefore some engineers are becoming, partly in spite of the profession, solvers of social problems; not only creators of technical devices, but designers and creators of processes involving both machinery and men.

It might be argued that industry is satisfactorily working out its economic course. It is important, however, that we should understand the phenomena resulting from the application of engineering principles, so that we may check our philosophy and enlarge its application.

The Function of Engineering

Engineering discovers, creates and standardizes product; it creates and standardizes processes; and it provides machinery and methods. It deals with products, processes, and methods of industry.

Let us consider some of the evolutions of the machine that led to mechanization. Looking backward, the machine is first seen as a mechanical device for changing the form of some material which had previously been worked on by hand. The product or purpose of the machine already existed.

The newer machinery differs by comparison, although there is much in the present evolution of machinery that is similar to the old. But under the newer conditions of industry the work of research laboratories—metallurgical, chemical, electrical and mechanical, singly or conjointly—often creates the product and formulates the principles underlying processes, and these accomplishments in turn suggest mechanical features or methods. The development and application of lacquer is an illustration. Methods, in the engineering sense, are closely allied with scientific, as well as physical and mental processes in the formation of products. This should also be so in the factory sense, but often they are considered largely as physical ways of proceeding only.

Under the older conditions the mechanics, managers, or inventors who built machinery provided primarily a device for doing a kind of operation. Power was often considered a matter of attaching the new machine to some central power source, or left to solution by trial and error. It was expected that man power would provide the means of set-up and manipulation and that it would deliver materials to and remove them from the machine. The creating of machinery was primarily a question of creating a machine to perform some particular cutting, forming or mixing operation. Other work was naturally left to factory operation, as was often the devising of machinery, and some very splendid work was so accomplished.

Modern mechanical engineering is interested in the broadest sense in scientific processes, production methods, and the complete processes of production. It is interested in time in the technical and cost sense, and in quantity and quality of product from start to finish. It is interested in man's relation to process. It is further interested in the time and cost of its own service as a part of industrial production and cost.

It is not surprising that so thorough an investigator as the man this Society honors in name and purposes should find, when he carefully considered factory processes and methods from the economic side, that he had also to do the following:

1. He had to develop an art for the forming, or cutting, operation of machinery. His studies made him dissatisfied with existing formulated laws and led to scientific research to improve existing standards.

2. He had to consider power, machinery, design, and speeds and feeds, in order to control time in relation to the unit of production. Engineering became more than a device for performing an operation. It was a problem of ascertaining the time in which work could be done. The art had been considered before the method and time were provided for.

3. He had to consider and provide means for material handling and manipulation.

4. He had to deal with man manipulation of machinery and tools.

These four points indicate that consideration was given to scientific research and the complete factory process. Engineering was seen to involve the whole situation and not mechanical operations only.

A careful study of Taylor's work clearly shows that these subjects received engineering treatment, and that techniques were developed where they had not been developed before. Hathaway and Merrick especially stressed the necessity of recognizing all classes of engineering that went into process and method; the fact that gain came from all of them and that often engineering construction offered more opportunity for gain in manipulation than in forming. It is of interest to mention this pioneer work, which advanced the philosophy of engineering. Present types of continuous process, automatic machinery, as well as much of the machinery used in variable industry, show that the true function of mechanical engineering is to consider the whole line of methods, including the primary operation of the machine and the manipulation of the supporting tools and devices. Various engineering sciences may have developed the arts and processes themselves and mechanical engineering, in its mechanization of industry, has to take them all into consideration. The complete economic process of industry involves everything from purely mechanical to physical and mental processes.

As we look back it seems natural that Taylor should have written into his principles of industrial organization, "A science must be developed for each element of a man's work," and also, "management should take in the duties of training and selecting workmen, and should co-operate with the workman to see that work is done in accordance with the science developed."

Machinery designed by the better type of engineering shows that these functions have been carried out. Much machinery, however, is evidence that they have not been recognized. This latter class of machinery requires a great deal of unnecessary and undesirable time study work to supplement the work of mechanical engineering. Even though good time study work may point out and partially correct what technical engineering has neglected, its necessity is an evidence of poor engineering. This is particularly true of machinery and methods, but it may also be true of the processes connected with the machine. If the complete function of engineering were recognized, much of this unnecessary work could be eliminated.

The work of the industrial and time study engineer should supplement the work of other engineers, but unfortunately their approach to problems is often from different angles. It is doubtful whether engineers will be able to eliminate the need for much time study work until they understand more thoroughly the time study approach, the purposes behind time study and the wider functions of their own profession. It is natural for the engineer to cope with immediate problems and to neglect the full purpose of his work. He thinks of the solution of problems as remaining the same and develops traditional ways of doing his work, just as traditional methods are developed in the factory. Scientific applications and developments are forgotten—for habitual methods. The industrial engineer seems to have the same failing. At times he confuses definite practices and the whole purpose of his profession.

Just as engineering is changing factory practice, even when products remain the same, so science is changing engineering. Engineering has shown that it can eliminate various operations and at the same time make a better product. There should be a wider application of this principle both in factory operations and in the primary work of engineering.

There has been no intention to underestimate the value of time study. At times one thousand dollars spent for time study may be worth more than one thousand dollars spent for machinery, even though it is hard for managers to see the value of time study because, unlike machinery, it cannot be entered on inventories. Time study is also very helpful in a great deal of the work of industry that is not mechanical. It properly should deal with such situations and with existing machinery. If engineering, however, will deal rightly with present problems many future problems will be eliminated.

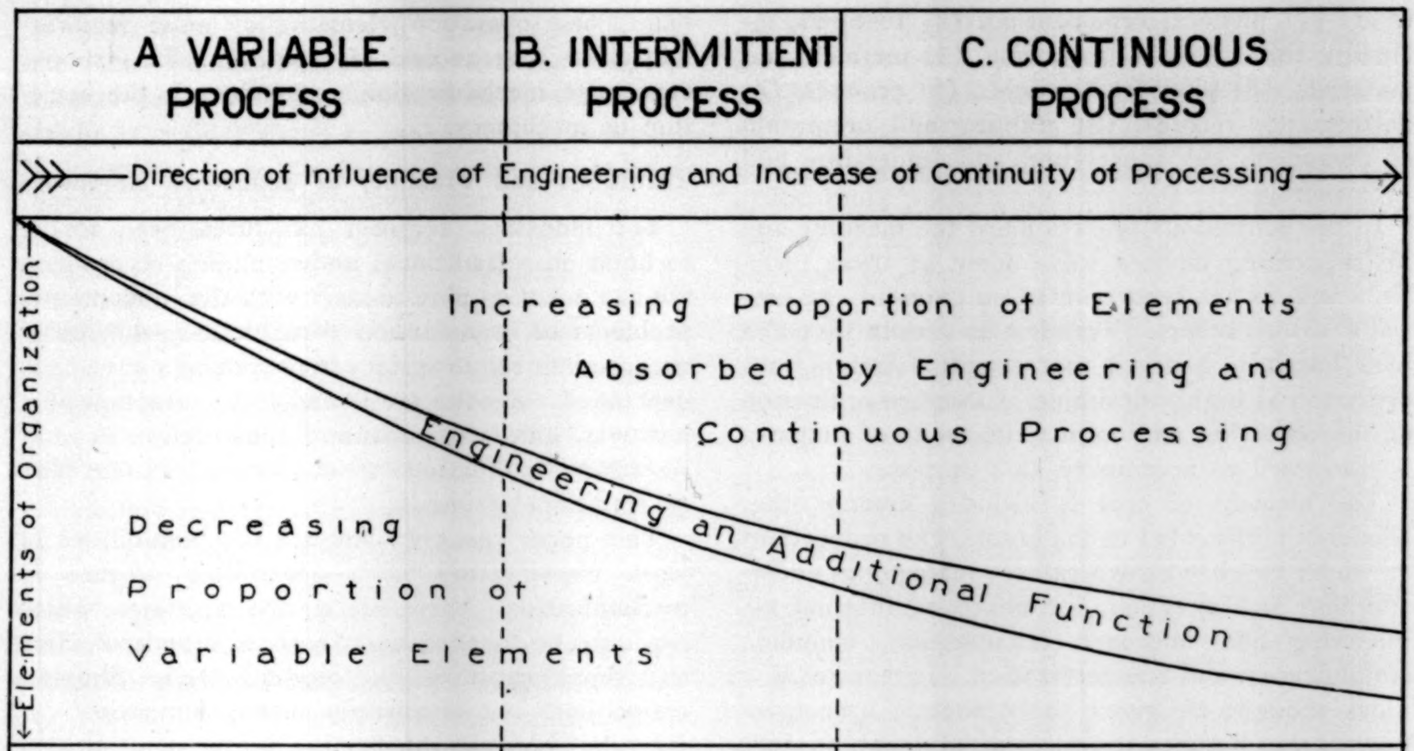
Subdivision of Labor and Organization Changes

The newer industrial processes have brought about minute divisions of labor, until one man does only a very small part of the work on a product. Often the mechanical aspects of this subdivision have been considered to the exclusion of its larger meaning. Problems of administration and supervision, as well as changes in workers' duties, have come about as a result of the various engineering and constructive organization forces that have been at work. Three things have happened:

1. Work has been subdivided and mechanical energy substituted for manual.
2. The machine has absorbed many administrative and supervisory functions.
3. Separate departments have been set up for planning materials, products, processes and methods.

In the early days of machine industry, machinery was planned and work apportioned by plant operators. Small plants and limited scientific development permitted this; large plants and scientific developments have made it impossible. It is now necessary for one group to build the organization and another to run it. Each group supplements the other.

Now that some of the engineering and organization problems related to the technique of management and mechanization have been brought out we shall proceed to examples in variable, intermittent and continuous processing. Figure 1 shows the evolution of an industrial organization toward continuous processing, and suggests the consequences of an installation of continuous process machinery and also the influences of allied engineering services. It indicates that these influences, in addition to working out materials, processes and methods, are also, when carried far enough, establishing lines of control, supervision and administration.


A VARIABLE PROCESS
B. INTERMITTENT PROCESS
C. CONTINUOUS PROCESS
Direction of Influence of Engineering and Increase of Continuity of Processing
Elements of Organization
Increasing Proportion of Elements Absorbed by Engineering and Continuous Processing
Engineering an Additional Function
Decreasing Proportion of Variable Elements

A. 1. (See C. 1) Planning and Control; Administration and System.
Routing, methods, devices and schedules are determined. Materials and tools, specifically supplied; and materials, tools machinery and men accounted for and co-ordinated.
Time studies, engineering calculations, speeds and feeds, tasks, and record of performance established.

2. (See C. 2) Supervision.
Preparation, methods, and inspection of work.
Training of help.
Maintenance of equipment.

3. (See C. 3) Product
Largely created by operating forces.

4. (See C. 4) Work and Power.
Materials, tools, and machinery manipulated by hand power.
Materials cut or formed by hand power.
Materials cut, formed, or mixed by mechanical power.
Materials, tools and products moved by hand, or separate conveyance.
Hours of manual labor high in relation to unit of product and power.

5. (See C. 5) Standards.
Produce standards established and maintained by devices and trade ability.
Method standards maintained by trade ability and records.

B. Duties and conditions of Plant Operations are modified in the direction of C. Manual labor, supervision, and administration are partly absorbed by machinery and mechanical power.

C. 1. (See A. 1) Planning and Control.
Routing, methods, devices, and partly scheduling are absorbed and predetermined by equipment. Materials are supplied from one operation to another by machine; and machine functions and men co-ordinated.
Time studies, engineering calculations, speeds and feeds, tasks, and performance are built in, established, and therefore absorbed by machinery process.

2. (See A. 2) Supervision.
Preparation and methods absorbed by machine and engineering it represents.
Training of help for operation simplified.

3. (See A. 3) Product.
Partly created by operating forces.

4. (See A. 4) Work and Power.
Materials, tools and machinery manipulated by mechanical power.
Materials cut, mixed or treated by mechanical power.
Materials and product moved by co-ordinated machinery and power.
Investment in Machinery and H. P. high to hour of manual labor.

5. (See A. 5) Standards.
Established and necessitated by standards of machinery.

Figure 1. Influence of Engineering and Continuous Processing on Workers, Supervision, Administration and Accounting.

Colonel Hathaway some thirteen years ago said that the aim of industrial organization was to approach continuous processing. The same major problems must be solved whether continuous process or other equipment is provided, but the means of solution differ.

In the variable and intermittent processing plant, the following organization and operating problems exist: (1) physical organization, (2) research, including time study, (3) systems, (4) methods and materials, (5) plans and policies, (6) product, (7) performance records, (8) training and promotion of personnel, (9) supervision and leadership, and (10) morale.

In the continuous process plant the machine and its supporting devices solve some of these problems and, as has been pointed out, simplify or partially absorb others. Training may even be taken over but it is believed that scientific training for operation is highly desirable. Closer co-ordination of the operating and engineering ends of industry is necessary to accomplish this purpose.

The element of cost is included among other elements represented in the chart. The proportions to which this has grown call for managerial understanding and direction, for improved internal engineering and improved organization, including simplification and standardization. It requires that more thought be given the economic aspects of engineering because the costs of engineering make up a considerable part of production costs.

Three stages of organization are indicated on the chart—variable, intermittent and continuous processing—but no indication is made as to which of these stages is good and which bad. As a matter of fact any of them could be either good or bad. There may be reasons why an industry is in one of these particular stages. No matter what the stage, there is room for mechanization, and it is one of the objects of this paper to show the desirability of approaching mechanization regardless of the stage.

If some plants that are classified under variable or intermittent processing were to use the engineering skill and equipment available they would rapidly progress toward continuous processing and receive some of the economic benefits. The managers of these plants would probably argue that it is not equipment but product that puts them in the variable or intermittent class. This may be partially true. If products are variable, however, it is primarily processes in which they are interested, and an analysis of operations and elements of operations would show that both are repetitive. A plant may be highly variable as far as its product is concerned and still be highly repetitive as far as its work is concerned. A careful classification of the products, common operations (machine and hand) and operation elements of most factories will show a great deal of repetition. This should encourage mechanization and influence the selection of machinery.

Traditions and Practices of Industrial Engineers

The industrial engineer has often been forced to build on a traditional understanding of product. He has not been able to start with the fundamental problems of organization construction—sometimes because immediate surface improvements have been demanded. Results are bound to be disappointing, however, unless organization construction is built on strong foundations of engineering rather than on traditional grounds.

This paper can only indicate the possibilities of work classification as a controlling feature in mechanization. There are all the questions, which can only be touched upon here, of standardization and simplification of the product itself. Simplification does not necessarily mean elimination. It may be brought about in design and in coordination of methods. It seems that the engineer has too often failed to realize that the product is an important consideration in reorganization plans.

A considerable amount of mechanization has taken place in the design of single unit machines used in variable and intermittent processing. Manufacturers have suggested that engineers consider in their designs the time involved in forming materials, manipulating the machine, and in handling tools and materials. Two advertising cuts of a manufacturer of machinery furnish an illustration. The one shows an old style machine, with the operator walking back and forth and around, in order to prepare for even a small cutting job. The other shows a new style machine which permits the operator to stay in one place while he adjusts and operates it. Movable parts which were formerly moved by hand are moved by power traverse. Does not this newer type of machinery simplify employe relations and change the human problems involved? I question whether any of us would wish to go back to hand starters and the old style tires on automobiles, and yet we still get a great kick out of driving cars, at least on the open road. As engineers designing machines, we should consider our operators in the same light that the producer of automobiles considers his customers.

Managers and engineers in the machine tool industry deserve high credit for their work in the automobile industry. Their excellent and comprehensive work, stimulated by keen competition, has undoubtedly done much to make cheaper automobiles possible. The machine tool industry has been a leader in designing improvements and the automotive industry and the public were fortunate in being able to draw upon this engineering skill. Other industries with large problems in engineering would be fortunate if they could profit also by such applications of engineering skill to the fields in which they operate.

Examples of Problems Absorbed by Mechanization

Some may question the claim that mechanization has absorbed problems of accounting, control and supervision. Let us take two extremes of supervisory practices. Under the old conditions, where little or no machinery existed, a gang boss set the production pace and attempted to keep work moving. It was his influence that determined how many units were produced in a man hour. Under the new system of continuous processing the machine controls the number of units produced per machine hour and also the number of men necessary to supplement the work of the machine. It sets the tempo. There are numerous modifications of these two extremes at the present time. For purposes of discussion they fall into two groups: (1) industries where tasks are set largely by foremen and workmen from tradition, and (2) industries where tasks of some form are set as a result of time study and other data. In either case supervision is concerned with the accomplishment of tasks. It is a constructive influence which has to do with the preparation and flow of materials and with the production of quantity and quality of goods.

Supervisory work is a combination of physical and psychological acts performed in relation to men, materials, equipment and processes. It involves also reciprocal acts of co-ordination and cooperation with other departments and functions of the business.

Let us assume that there are four operations to be performed on a number of pieces of work in a variable or intermittent plant, where machines are separate production units. If it is a well ordered plant of any considerable size the order of work will be planned and the materials, special devices and instructions for doing the work will be on hand before work is started. If we assume this situation, the following things will happen: The foreman receives instructions concerning a job; he sees that the necessary materials and devices are on hand and in good condition and investigates the job so as to obtain a clear picture, if the job has not been handled before, of what it requires; he advises the operator of the order in which the operation is to be performed and gives the operator his concept of what it requires; he is responsible for the operator's checking in on each operation, so that accurate time and cost records may be kept and the progress of work through the shop, and its co-ordination with the other work, controlled; he approves work before the operator checks out and is responsible for the return of instruction sheets and devices, and for the care of materials and their delivery to the person that moves them to the next job.

The procedures described would be modified on different jobs but these will suffice for illustrative purposes. They would be repeated for each of the four operations. This would mean direct supervisory work before each operation, reciprocal relations with the planning or shop management department, and cost records for each operation. If a continuous process machine were developed to do all four operations, the reciprocal acts of control, the intermediate acts of physical and mental supervision and the physical acts of moving materials would be absorbed and therefore would no longer be necessary. Cost records would no longer be necessary for four operations because the four would have become one. Management problems are greatly simplified under conditions such as these.

Supervision could often be improved in variable and intermittent industries if they would copy more accurately the principles applied in continuous processing. In the continuous process, operation is practically impossible unless all the preparatory activities have been carried out precisely and in order. Plans, instructions, tools, materials, are all prepared in advance. It is not possible for one operation to depend upon another for service. Continuous processing encourages and forces good management. The trouble with non-continuous processing is that it permits any kind of management.

Principles of Variable and Continuous Processing

The foregoing discussion and chart have attempted to show that the problems of organization control that exist under variable processing are absorbed under conditions of continuous processing. It has also been indicated that the principles and purposes remain much the same. The same fundamental practices are essential to success under both forms of organization. Even though there has for years been a philosophy of industrial organization as a guide to industrial development, the tendency to adopt a definite system or mechanism of organization still exists. Fairly successful results may come out of this tendency if conditions match those that are being copied. This is, of course, seldom the case, and visitors from one plant to another are often disturbed because they cannot take back some definite plan to apply to their own situations. It will be seen by consulting the chart that the same problems of organization must be faced by both variable and continuous process industries if scientific management principles are to be applied to both.

Some of the problems of industrial organization, besides the problems of training, are: the selection and design of equipment; the compiling of data on plant and machine capacity; the development of routing, methods, processes, mechanisms of coordination, reciprocation and accounting. All these have to be given the proper consideration so that an even flow of production may result.

In a variable industry machinery is not automatic and therefore data on machine capacity and time studies on work not covered by machinery are not a part of the organization structure. In the continuous process industry, time per unit is taken care of by the machine itself. In a variable industry, routing of work must be done for each order or class of work, whereas this is built into the machine in the case of continuous processing. Because of separate producing units in the variable industry, special mechanisms of accounting, control and supervision are necessary in order that coordination of effort, materials and machinery may be accomplished. Mechanical devices furnish this control in the continuous process. In the variable industry records of accomplishment must be kept, or memory must be depended upon, whereas in the continuous process industry machine and engineering data furnish these. Simplification and scientific administration are the natural results of continuous processing.

Reorganization and Mechanization

In reorganizing an old enterprise, the plane of mechanization toward which the enterprise is progressing must be considered. Organizations too often have in mind only the plane upon which they have been operating. They do not keep in mind the goal immediately ahead.

If it has been shown to be desirable, it is difficult to understand why industries do not more rapidly take on new machines and move toward continuous processing. Buying is done piece meal and often with no definite plan in mind. Machinery that has long been obsolete is carried on books. We can still observe manufacturers who buy second-hand machines worth thirty-five dollars or less for several hundreds of dollars. Or if they do not buy them they keep them in their shops. Even the poor man realizes that he cannot afford a thirty-five dollar automobile. This should be broken up for old metal, and so likewise should the old machine. It should not be allowed to clog our industrial organizations.

Andrew Carnegie is quoted as having said: "It is surprising how few men appreciate the enormous dividends derivable from investment in their own business. There is scarcely a manufacturer in the world who has not in his works some machinery that should be replaced by improved appliances; or who does not for want of additional machinery or new methods lose more than sufficient to pay the largest dividend obtainable by investment beyond his own domain. And yet most business men whom I have known invest in bank shares and faraway enterprises, while the true gold mine lies right in their own factories."

When we see real success in business we often wonder what caused it. We find upon examination that certain definite principles have been applied consistently and thoroughly, rather than haphazardly. Competition has forced the automobile industry to take advantage of advances in design and new equipment, and has materially aided in establishing its remarkable methods. The changes forced upon it have kept its equipment scientifically up to date and have prevented old age. The recent changes in some of our large industries will prove not to have been the calamities that some believe them to be, but rather the salvation of industry and a gain to society.

It is curious that the modern banker, in view of our industrial progress, will take any chances with industries whose equipment has long been obsolete. At Saratoga or Belmont he would not buy a horse that had long been out of the running. Fancy harnesses or saddles in the form of budgets will not make old machinery run fast any more than such trappings will make an old horse run fast. It is claimed that some old industries have an advantage because machinery is carried on their books at practically no cash value. While this may be true in isolated instances, it has little significance. Large industries are going out of business in one locality and being built up in others. And whole factories are being replaced within industries. This means leaving old machinery and traditions behind, in much the same manner that the old automobile is left beside the road. The ingenuity that built up these plants apparently has not kept pace with progress. The old policy of making money by retrenchment is still with us, but it is becoming more and more dangerous as a long-run policy.

Some years ago I was assigned the task of ascertaining whether or not some of the older plants within an organization could be revived. The products of one of these plants had at one time led in its field. The original work in the plant had evidently been done by very remarkable men. Equipment had been installed for every possible operation, large and small. Control, accounting and other organization features had been well worked out. It had been a beautiful piece of work for its day. In fact it was so perfect that no changes had been made in it. It grew old gradually and generally. Product and processes had not been kept scientifically alive. I question whether spotted improvements would have kept it virile. Any marked improvement in product or process involved a problem of balance. Either complete reconstruction or scrapping was recommended; and the final outcome was that the plant was scrapped. Other plants presented less extreme problems but it was clearly indicated that only new construction would solve some problems and that reconstruction of practically obsolete equipment was not feasible.

Experience in other industries has shown that many problems are only to be solved by new construction. Improvements in two of our largest industries, steel and textiles, show that whole plants have been reconstructed or discarded. No remedies would have helped some of these plants. One of these industries has fortunately rebuilt partly on its old ground.

There are numerous companies that could bring their plants up to date mechanically by installing the equipment that the market affords. This alone would mean a marked forward stride for industry. Other companies could very profitably utilize a more constructive engineering program.

Progressive Engineering Maintenance and Depreciation

Rapid engineering developments have forced modern industry to face the problems of engineering maintenance of organization, as distinct from mechanical maintenance. A company that recognizes such maintenance problems will have ideas concerning obsolescence as well as new ideas concerning depreciation. The company that does not face the problems of maintenance will eventually discover that its depreciation practices are unsound. The lack of physical maintenance evidenced in many factories, hotels and stores, together with a lack of progress, means gradual but certain death.

More rapid scrapping of old machinery in American industry would make for better business all around. The country might well interest itself in better plant machinery as well as in better roads and theatres.

Leaders in industry realize pretty clearly the importance to production of continuous process machinery, and therefore the importance of engineering. The fabrication points have been the places where economies have been effected. But with the emphasis that has been placed on engineering there has come a shifting in expense. Improvements in machinery are not all gain. Economies are now being sought at another point—where operating machinery and processes are being produced. The importance of economies at this new point has in some industries outweighed the importance of economies in the old field.

There are, then, two points of special interest to management in this new alignment. It must support engineering because of the stage of industry in which we find ourselves, and it must effect economies within the engineering field. It is not so much a question of whether or not management is interested, but whether or not its interest is in proportion to the existing and potential problem. The problem is part of the new economic fabric of industry and cannot be ignored.

The influence of engineering is to carry industry toward larger and larger investments of capital. Operation is becoming more and more simple and engineering more and more complicated. Some claim that the simplification of operation will be extreme, and this claim is justified in some directions.

There are interesting related sociological aspects of the problem which are to some extent indicated in the order of change. One thing is certain and that is that operators, no matter how many there are, should have a part in both creation and operation. Their interest in processes and products should be sought. Schools should be established, and have been to some extent, to furnish a scientific understanding of production processes. This would mean larger opportunity for creative expression.

A division in responsibility is upon us and we must decide who is to lead, administer, manage and engineer. A more rapid adjustment of the social problems involved is essential if the application of industrial engineering principles is to go forward rapidly. These adjustments should make up a larger and larger part of the industrial engineer's task.

Engineering as a Process

In order to bring about improved engineering practice, and its more extensive rise, it is essential that engineering be seen as a process as well as a technical science. It should be accepted as a life process and not merely as a tool. The industrial engineer should desert traditional approaches and unite his efforts with those of the technical engineer, since he is concerned with the whole organization. As he has been able to do away with unnecessary operations, so he should attempt to eliminate organization problems. The technician should also recognize the psychological problems with which the industrial engineer has long contended. He should work for a wider appreciation of the work of time study. If the technician realizes his work is with both men and materials, he will have a broader understanding of processes and be able to improve his designs. Machinery and processes are fairly regulated by men, and their mental processes have to be taken into consideration.

By a better understanding of engineering philosophy the engineer will see more clearly final results and values, as contrasted with immediate ones, and will be better prepared for comprehensive accomplishment. It would seem that the engineer has yet to see himself in relation to the influences he has created.

The scientist knows that his professional ethics are tied up with the application of his science. In applying science to industry, the engineering scientist has learned that scientific and moral truths go hand in hand, when the effects of science are understood. This understanding makes more certain the adjustment of internal and external social problems.

The practice of establishing research and engineering departments and then ignoring them is hard to understand. This new member of organization is still a bit strange, and we often hear that a research or engineering department has been reorganized so as to co-ordinate more closely with production. There is an old and inborn fear of this new monster, science. Managers and workers like its immediate results but at times dislike the necessary concomitant changes.

The confusing thing is that engineering, once an auxiliary tool, has now become a function. We must think of engineering as a process.

J. A. Willard.[2] The outline of this paper received before the meeting states that it "treats with the position of engineering in the economic structure of business."

This paper is a further able defense of the engineering profession in industry, and it does not appear necessary or desirable to add, in this discussion, to this defense. If in the past it has been necessary, it is believed most earnestly that the fault lies with the engineer himself. By and large, he has been too much concerned with his position in industry and too little concerned with rendering a broad gauge service to mankind.

Progress has been relatively slower because engineers did not use common sense in selling their ideas and methods to the more practically minded manager and banker. An earnest effort on the engineer's part to think in terms of the other man's point of view will almost always find him eager and ready to adopt the program, when presented in the language of dollars and cents and from the operating viewpoint.

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[2] Treasurer, Bigelow, Kent, Willard & Co., Inc., Boston, Mass.

But, even if the engineer has "made his bed," he does not have to lie in it. He can trade it in for a new model and look at his problems from a broad human point of view, based on a deep spiritual feeling of service.

The statement of the author that he does not believe that industry is over mechanized is ably supported by the paper presented to the American Society of Mechanical Engineers this morning by Messrs. Alford and Hanna. They present a picture of a very low average of machine efficiency throughout industry. This condition has been verified by my own experience. It is firmly believed that progress ten years hence will show even greater advances than the last decade, and, in all probability, we shall find about the same percentage of managers who are loath to keep step with this progress. Declining profits will eventually force them into improvement or bankruptcy.

Personally we are much more concerned with the over-merging of industries than we are with over-mechanization; this, not at all because of the building of unwieldy organizations, but on account of the weakening of the effective man power of these organizations. I have recently witnessed two mergers from a professional viewpoint, and in both cases remarkably fine organizations have been broken up and scattered. The loss of this high grade executive man power cannot help but be reflected in subsequent loss of profits. It is not good for business as a whole to scrap men, who from long experience in the manufacturing or merchandising fields of a specific business are good profit makers in that business and practically useless out of it.

Again it is a case of neglecting the importance of the human factor in business.

To revert to the title of the paper, we believe a theorem can be stated to cover the relation of engineering to the various types of manufacturing plants as follows: Control methods in an industry increase as the human factor increases.

This has been clearly indicated in the paper under discussion.

A paper mill and the average cotton goods mill are good examples of continuous process plants which need a minimum of engineering control for their successful operation. Nevertheless what control is necessary must be good or the business will fail.

You can build standard speeds and feeds into a lathe or a rip saw, but that does not mean that someone who doesn't know any better will not try to run it at half its normal capacity. Effective management and control are vitally necessary even with highly engineered equipment.

I had an experience with a plant in the Mid-west about a year ago which produced a line of goods susceptible of being made by automobile manufacturing methods; in fact, they were tooled up and conveyor equipped for such methods; but, because of a breakdown in management control they were being run largely as a huge job shop with almost 15,000 employes.

The author has pointed out clearly in his chart the elements of control needed in different type plants, but each plant must be treated as an individual case and ultimate success is dependent on the accurate adaptation of control to the human factors in the particular business.

Henry Post Dutton.[3] Mr. Schulz has brought out very clearly the differences in control between the continuous or flow industry and the variety or jobbing business. If we analyze the various production steps such as plant layout, routing, supply of materials, scheduling, dispatching progress records, and follow-up, as Mr. Schulz has done, it becomes possible to indicate, as he has done in his chart, how each of these is simplified or embodied in the plant, in continuous production. It is also possible to separate these elements into two distinct classes, corresponding closely to the classification of fixed costs and costs proportionate to volume, used by Mr. Williams. Instruction of the workman, routing, layout, scheduling of the lot, are in the nature of proportionate costs done only once for an order, with little correspondence to the size of the order. Dispatching, progress records and follow-ups, tend to be more closely proportional to volume as, of course, does the actual work of operation. As the size of the lot increases and the number of lots decreases the incidence of these costs per unit becomes less.

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[3] Professor of Factory Management, Northwestern University, Chicago, Ill.

The costs proportionate to the volume also tend to decrease somewhat as the lots become larger, due to the possibility of using large-scale equipment, which would be too great a burden on a small lot. There is no question any longer that the combined influence of these two reductions in cost with increasing volume constitutes a very powerful argument for continuous production. The country, however, is today in a very mixed state. Some industries, as the automobile, are well advanced. I believe a majority of the industries in the country are still of the jobbing type. Where this is the case the manufacturer finds himself in a dilemma when he seeks to increase his volume. The question cannot be settled without considering also the marketing phases of volume production.

Take the manufacture of screw-drivers as a case in point. There are, I believe, over one hundred screw-driver manufacturers listed in Thomas' Register. Many of these also manufacture a variety of other tools, such as braces and bits. Each of the hundred must divide the business with the other ninety-nine: must, to hold the trade of the people to whom he sells, make a relatively complete line including all sizes and grades. With hand to mouth buying, this means exceedingly small lots and continuous production is quite impracticable. No one of the manufacturers would be in a position to break the deadlock without the resources necessary to carry through a reorganization, not only of his production methods, but of his entire system of marketing. In time, of course, some one manufacturer is almost certain to do so, yet even the decision to specialize on one line is not sufficient for salvation, for regardless of what may be said of the economical advisability of this or that plan of production, manufacturers must still be controlled to a large extent by strategic considerations of their markets. Can the manufacturer afford to abandon his numerous small customers to a single jobber, losing the identity of his product and the control of his market? Such questions as these must be taken into account as qualifying the advantage of quantity production.

Mr. Schulz has emphasized in his talk, somewhat more than I expected him to do from his outline, the importance of engineering technique in the process of putting industry on the flow basis, and has given us a picture of the ultimate ascendancy of the engineering method. Such questions as that already discussed—the strategic control of industry—indicate that the solution of business problems is not purely a matter of mathematics.

Unquestionably the engineering approach, when it is combined with experience and aptitude in diplomacy and dealing with men and with financial problems, tends to produce the very highest type of business leadership. Yet, by his nature, the engineer is a man who has probably been drawn to his profession by a preference for combat with things rather than with men. Mr. Hoover to some extent, I think, illustrates a native aversion to dealing with people, which has been corrected only as a result of a most determined self-analysis. Some years ago I read a very suggestive discussion by W. L. George of the various types of leadership. The article pointed out how the warrior, the priest and the lawyer had each been superseded because he turned his face to the past. Neither the business man nor the engineer is subject to this limitation. Neither is bound by precedent. Yet, of the two, because the engineer is interested in processes, while the business man is interested in results, George believed that in the end the business man would probably prevail. The type which is today prevailing is in many instances a type which starts with the rigid discipline of the engineer and ends with the intuition and the executive grasp of the business man.

Richard H. Lansburgh.[4] I feel that Mr. Schulz has presented a very remarkable paper, and the distinctions which he has drawn between continuous, intermittent, and variable processing are very excellent. I am going to take only one phase of Mr. Schulz's paper for discussion and that is what he has had to say concerning mechanization. I will not agree with either Mr. Schulz or Mr. Willard in their comments on mechanization. Mr. Schulz indicated that he felt that the probability of workers' being thrown out of jobs through the introduction of new machinery was worrying employers to a greater extent than workers at the present time, and intimated that this situation would adjust itself.

I do not believe that employers are worrying about this new situation nearly as much as workers. In a survey which I made of a number of plants through the Middle West and East last summer I was unable to find a single executive who had given real consideration to what had happened to the employes that had been thrown out of his plant through the development of new machinery. On the other hand, workers, organized and unorganized, have been giving very deep consideration to this matter. They know it is idle to say that if a machine throws them out of work they will find employment in selling insurance, operating gasoline stations, or house-to-house canvassing. These are three of the employments, together with the rise of the radio and automobile industries, which have many times been given as the occupations in which men thrown out of work by new factory machines have found employment. As a matter of fact, we have seen some figures concerning the extent of increase of persons in these occupations, but we have no facts that this increase is composed of displaced factory workers. In addition to fearing the loss of his job and skill through the introduction of new machinery, a worker of today must fear inability to get employment if he is over forty-five years of age. The development of this new age limit in industry has done much to aggravate the conditions which have come about through the displacement of skilled labor by machines. For instance, the painter who has been thrown out of work by paint-spraying machines is not usually the type of man who can make a living selling insurance, or selling silk stockings by house-to-house canvassing. Many of these men are totally unfitted even to operate the paint-spraying machines which have displaced them, as the years of apprenticeship and experience in their trades have subjected them to lead poisoning and a general physical environment which has not been conducive to passing a physical examination in someone's plants. And, in addition, they now find themselves above an arbitrary age limit for employment.

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[4] Professor of Industry, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia, Pa.

Effects of the new mechanization in industry are peculiarly severe because it has been fashionable to deny that there are any ill effects. It is only as industrial executives throughout the country recognize the problem, and take means to attack it, that progress will be made. This will come about during the next few years, for there must come a very different point of view regarding age limits in industry. Executives will feel a greater responsibility for placing men that machines have displaced in their organizations. If the purchasing power of the country is to be maintained, and therefore, if business is to be maintained, this point of view must prevail. We need much detailed study of the effects of mechanization, so that facts may replace theory and desire as the bases of executive action.

Clifton Reeves.[5] It may be of real aid to the industrial engineer in introducing his work to form committees made up of members of a company's organization, after the organization has been sufficiently studied to determine who has the vision to properly appraise the value of engineering work. There is also a need for enlisting the active co-operation of the company officials and executives so that, after the consultant has completed his work, it may be taken up, carried on and improved upon by the regular staff.

A case I have in mind had to do with the formation of several very important committees to assist in bringing this particular property back to health and profits. The industrial engineer on the job was either chairman or a member of each of these committees. The first committee formed was the "economy committee." It was composed of certain office and plant officials and its function was to examine the duties and rates of compensation of all employes. It had also to consider matters of company expense and to recommend salary and personnel changes in order to reduce expenditures and increase efficiency. After this particular committee had been at work for about a year and a half the executive vice-president and general manager of all the six plants stated, before a meeting of several plant managers and executives, that the economy committee had effected savings in overhead amounting to over $3,000,000 without interfering with good operation.

Our experience has been that this co-operative method of enlisting the help of the resident organization for the success of consulting engineering work is very necessary. We do not believe that most businesses are conducted by inefficient or poor methods. Our experience has taught us, however, that there are preventable wastes in industry. After close analysis plans can be formulated to prevent such wastes, whether they be due to improper

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[5] Clifton Reeves & Associates, Consulting Engineers, New York.